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RESEARCH NOTES

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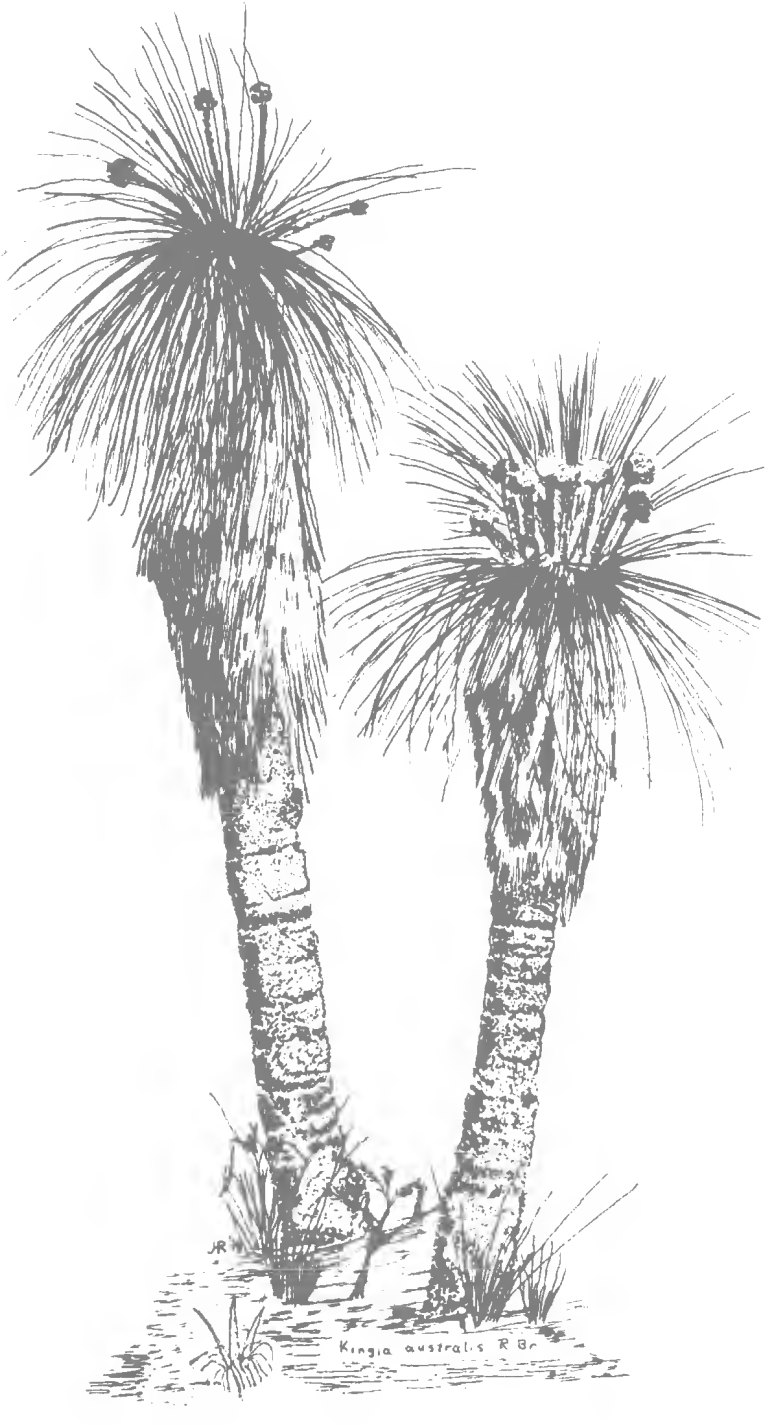

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Western Australian Department of Agriculture

Number 11 April 1985

INSTRUCTIONS TO AUTHORS

1. Papers dealing with flora and vegetation of Western Australia will be considered for publication.

2. Style should follow that of a recent issue. All *instructions*, including drawings, maps, graphs, and photographs, should follow a single, numbered sequence in each paper. They should be submitted in their final size for printing (maximum dimensions 15 cm x 24 cm including space for caption). *References* should quote titles of periodicals in full. Authors should suggest a *short title* for page headings.

3. Papers will be reviewed by an editorial committee. Contributions should be addressed to The Editor, Research Notes, Western Australian Herbarium, Department of Agriculture, George Street, South Perth, Western Australia 6151.

4. VOUCHER SPECIMENS: It is suggested that botanical names central to the objective of the paper be supported by specimens deposited in a recognized herbarium and that the institution be cited in the paper. It is desirable to quote, in the paper, numbers identifying specimens whose determination is uncertain. An explanatory note on the subject is available from the Editor.

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WESTERN AUSTRALIAN HERBARIUM RESEARCH NOTES

No. 11, 1985: 1-40

STUDIES IN THE GENUS *DRYANDRA* R. BR. (PROTEACEAE) I. SPECIES DISTRIBUTION, ECOLOGY AND CONSERVATION STATUS.

By E.A. Griffin

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ABSTRACT

Distribution maps for each of the 66 known species of Dryandra, *including 10 that are undescribed, are presented, together with brief notes on their morphology, habitat, flowering period and conservation status.*

All of the species are restricted to south-western Australia, and isoflor diagrams show two nodes of high species richness, near Eneabba and around the Stirling Range, with a narrow band of moderate species richness between the two. The species rich areas fall within the 400 to 600 mm annual rainfall zone, where they seem to be closely correlated with extensive areas of kwongan or sclerophyllous shrublands. Several apparently undercollected areas were highlighted in the course of the study.

Dryandra polycephala, D. serratuloides, D. squarrosa *and* D. *sp. A are considered to be endangered of being depleted in the wild state, while an additional 17 species have a vulnerable status.* D. formosa *and* D. polycephala *are the most heavily commercially exploited species with a further four species exploited to a lesser degree. Thirteen species are either not represented in conservation areas at all, or are in conservation reserves for only a part of their distribution ranges.*

INTRODUCTION

There are currently 56 recognised named species in the genus *Dryandra*, (Green 1981), and a further 10 recognisable unnamed species referred to as *D.* sp. A to J in this paper. The genus is endemic in south-western Australia. The plants are mostly low sclerophyllous perennial shrubs, although at least three species, viz. *D. arborea, D. praemorsa* and *D. sessilis*, attain the stature of small trees. Diels (1906) recognised the frequent occurrence of *Dryandra* in his "sklerophyll gëbusche", and more recent studies have shown them to be important components of some kwongan, or sclerophyllous shrubland communities, in terms of physiognomy (e.g. Beard 1976, 1979) and floristics (e.g. Griffin et al. 1983, Brown and Hopkins 1983).

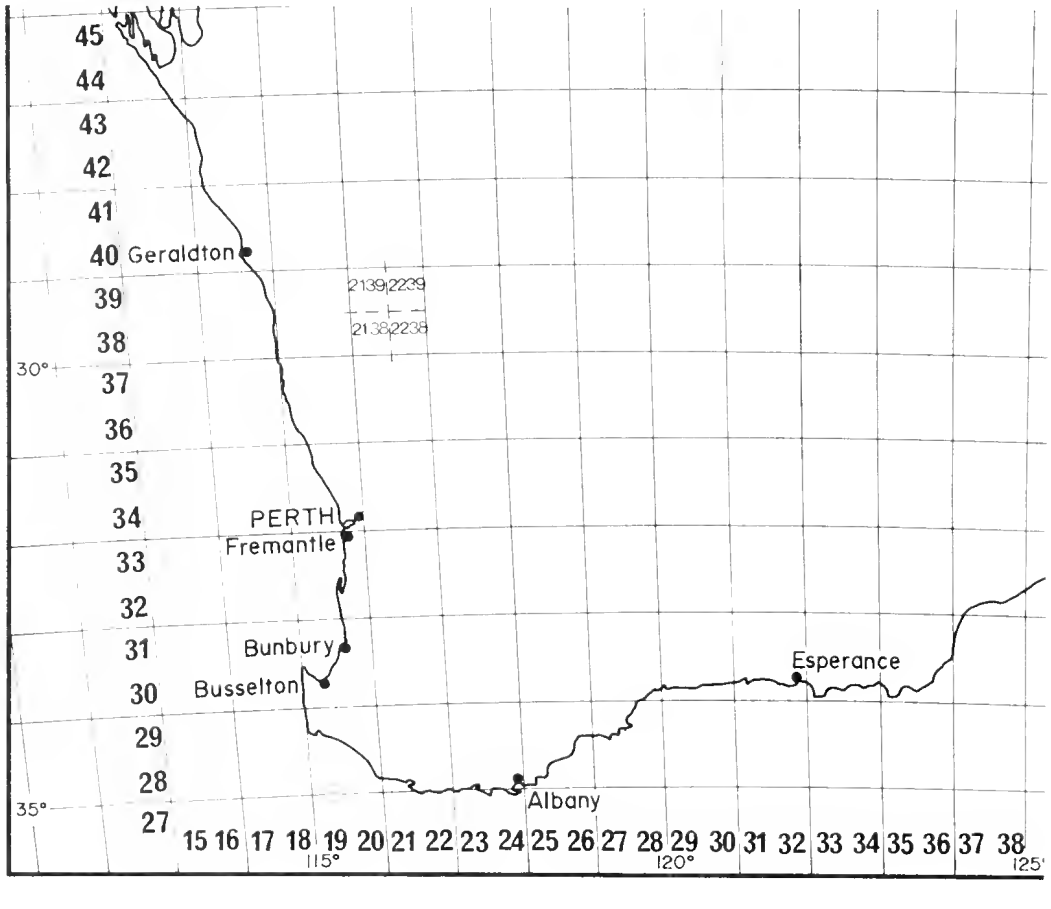
This paper presents distribution data on all 66 known species of *Dryandra*, together with brief notes on their morphology, ecology and conservation status. The distribution of *Dryandra* in relation to climate, soils and phytogeography will be presented in a separate paper elsewhere.

METHODS

The data presented were obtained principally from plant material, and from information on herbarium sheets, of specimens housed in the Western Australian Herbarium (PERTH), although specimens at the herbaria of the Botany Department, University of Western Australia and of King's Park and Botanic Garden were also examined. Species were identified by matching them with type specimens held in PERTH, and with designated specimens which had been matched by A.S. George with type specimens in other herbaria. Recognisable, but undescribed, species were included in the study.

All published *Dryandra* names were investigated, using literature available in PERTH, although synonyms are not listed here. Names given by Green (1981) as *D. sessilis* and *D. ferruginea* were referred to as *D. floribunda* and *D. runcinata* respectively by Blackall and Grieve (1954): *D. drummondii* Meissner, considered by Bentham (1870) to be a synonym of *D. calophylla* R.Br. but now considered to be a distinct species, and *D. arborea*, *D. cyanaroides*, *D. foliosissima*, *D. subpinnatifida* and *D. subulata*, which were described by C.A. Gardner in 1964.

The distribution ranges of all species were mapped using point records of collecting locations. These were plotted in grids of 0.5^{o} latitude by 0.5^{o} longitude dimensions, each grid being numbered as shown in Map 1. The grid cells of approximately 55 x 45 km size compares favourably with the 'optimal' size of 96 x 96 km suggested by Phipps and Cullen (1976) for biogeographical studies.



Map 1. Numbered cells for $1/2^{o}$ x $1/2^{o}$ grids (from Division of National Mapping 1:100,000 topographic map series).

RESULTS AND DISCUSSION

Two isoflor diagrams to show distribution patterns of the genus were generated from two data sets. Map 2 was based on herbarium data only while Map 3 incorporated additional observations made in the field by the author and K.R. Newbey, and also included conservatively inferred presences when there appeared to be unrealistic gaps in distribution patterns. Thus the isoflor diagram in Map 3 was an attempt by the author to depict the distribution pattern of the genus as it might have been with more intensive collecting.

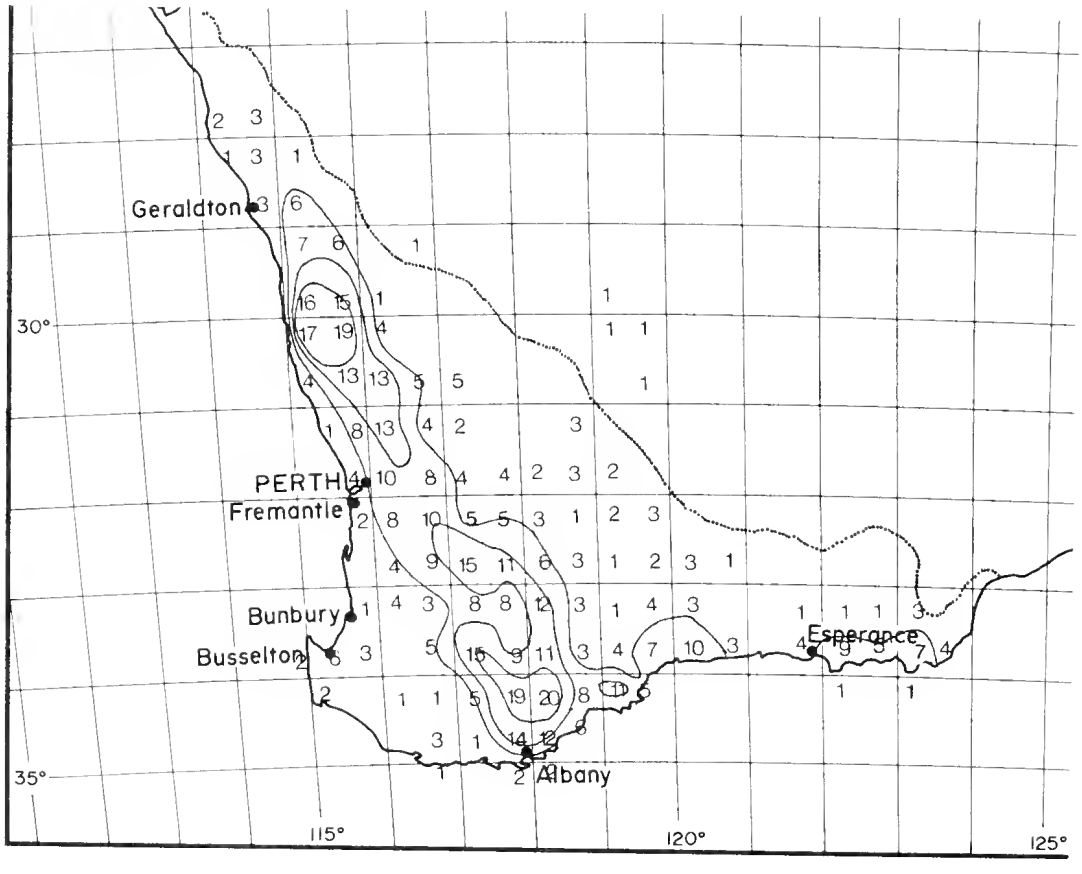
Collecting localities for each of the 66 species of *Dryandra* are shown in Maps 4 to 27, although for the sake of clarity some localities have had to be omitted. All species occur in south-western Australia, and all but *D. arborea* are restricted to the South-western province.

Notes on the morphology, ecology and conservation status of each of the 66 recognised species of *Dryandra*, including 10 undescribed, are given in Appendix 1.

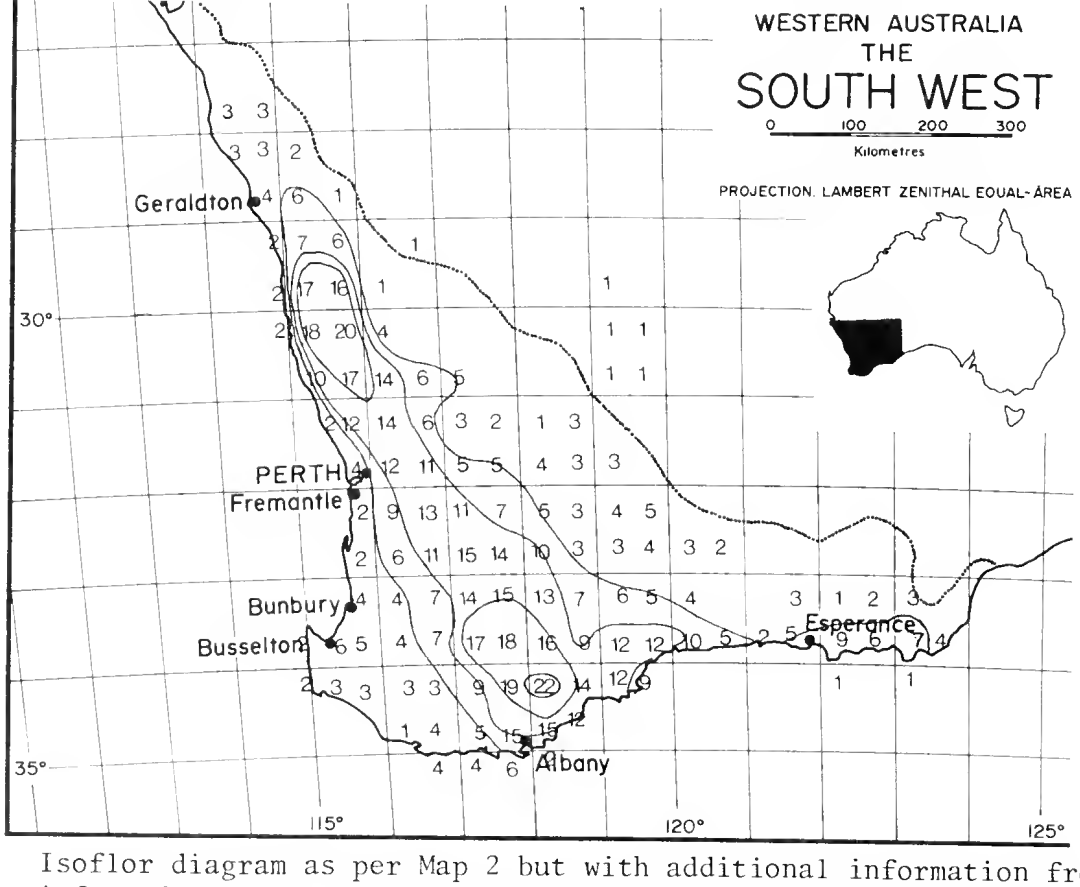
Species present in, or inferred to be present in, each numbered 0.5^{o} x 0.5^{o} grid cell as shown in Map 1 are listed in Appendix 2.

The distribution patterns of the genus, as depicted in Maps 2 and 3, appear to be similar to the isoflor diagram provided by Speck (1958), although detailed comparisons between the sets were not made. There are two nodes of high species richness, where the number of species per grid cell exceeds 20; one near Eneabba and the other around the Stirling Range. Between these nodes is a zone of moderate species richness, where the number of species per grid cell is between 10 and 20. Kwongan, or sclerophyllous shrubland, is the main vegetation type in the areas of high species richness. In the Karri and Jarrah forests species richness is low, less than 5 species per grid. In woodland vegetation, found further inland, species richness is also low. Thus the genus, which is found almost exclusively in the South-western botanical province, has the greatest number of species in the region bounded by the 400 and 600 mm isohyets, with the 300 mm isohyet defining the eastern, or inland, limit of distribution of the genus. This relationship between rainfall and species distribution is not necessarily a direct one, as the distribution pattern of each of the species of *Dryandra* also appears to be related to associated vegetation, soils and landforms.

The distribution patterns of collecting localities for each species, as shown in Maps 4 to 27, highlight many apparent gaps in distribution. While some of these are clear disjunctions, such as in *D. cuneata*, *D. drummondii*, *D. speciosa* and *D. vestita*, many of the other gaps may, in fact, reflect areas that have been under-collected, or that have suffered destruction in early days of naturally occurring populations, through landclearing for agriculture. A comparison between Maps 2 and 3 gives an indication of areas considered to be undercollected. These appear to be greatest between the towns of Wagin and Jerramungup, and around Albany. In both areas only about half of the species thought to be present in each grid cell have been collected. The area to the north-west of Esperance, which shows a paucity of species, could also be an area that has been undercollected. Apparent gaps in distribution shown in Maps 15 and 21 indicate that *D. nivea* and *D. sessilis* have been undercollected, particularly in the forested areas and along the south and west coasts.



Map 2. Isoflor diagram of *Dryandra* based on number of species, from Herbarium collections, in 1/2° x 1/2° grid cells. Contour interval was 5 species. Boundary of South-western botanical province (Beard 1980) is shown.



Map 3. Isoflor diagram as per Map 2 but with additional information from inferred presences in gaps and from reliable field observations.

Most species of *Dryandra*, apart from *D. polycephala*, *D. praemorsa* and *D. squarrosa* which are restricted to woodland or forest, occur in shrubland, particularly kwongan. Of the 62 species that are found in shrubland, 44 species or 71% of the number are restricted to that vegetation type. In woodland or forest associations, in which species of *Dryandra* are present, the shrub stratum is usually closed, or nearly so. *Dryandra* species generally prefer well drained sandy or lateritic gravelly soils, and only rarely occur in poorly drained clayey or calcareous soils.

The main flowering period, for the genus as a whole, is in spring, from August to October, as shown in Figure 1, although some species, such as *D. horrida* and *D. vestita*, have a summer to autumn flowering period.

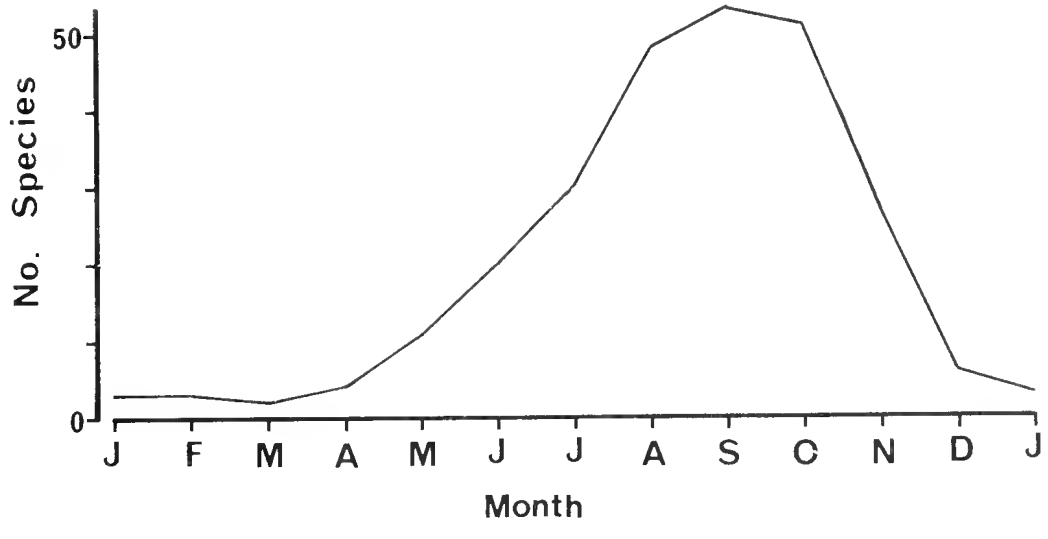


Fig. 1. Apparent number of species flowering per month. Data from Appendix 1.

The assessment of the conservation status of each *Dryandra* species, as shown in Appendix 1, was based upon information obtained from herbarium records, supplemented by additional observations. Table 1 lists species at greatest risk of being depleted in the wild state. They include *D. polycephala*, *D. serratuloides*, *D. squarrosa* and *D.* sp. A, although 26 species, or 39% of the total number, are considered to be under threat, with 17 of these vulnerable. About half of the species under threat are thought to be not represented in conservation reserves, while many others are probably found in conservation reserves for a limited part of their distribution ranges only.

The findings of Rye et al. (1980), together with those of Burgman and Hopper (1982), show that 32 species of *Dryandra*, or 48% of the total number, are being commercially exploited by the wildflower industry, mostly from

Table 1. Summary of species most under threat in the wild. Data from Appendix 1.

Categories of Leigh et al. (1981)*	Species	
X (Extinct)	-	
E (Endangered)	*D. polycephala* +	*D. squarrosa*
	D. serratuloides +	*D.* sp. A +
V (Vulnerable)	*D. arborea* +	*D. stuposa*
	D. cynaroides	*D. subpinnatifida*
	D. horrida +	*D. tridentata*
	D. patens +	*D. vestita*
	D. praemorsa +	*D.* sp. B +
	D. preissii +	*D.* sp. D +
	D. proteoides	*D.* sp. G +
	D. serra +	*D.* sp. J +
	D. speciosa	
R (Rare)	*D. comosa*	*D.* sp. F
	D. pulchella	
K (Poorly known)	*D. foliosissima*	*D. tortifolia*

\+ Species not 'conserved'
* See Appendix 1 for detailed explanation

populations in the wild. Table 2 shows that *D. formosa* and *D. polycephala* are by far the most heavily exploited species in the cut flower trade, followed by *D. quercifolia*, *D. drummondii*, *D. carduacea* and *D. pteridifolia*.

Commercially exploited species, such as *D. arborea*, *D. patens*, *D. polycephala*, *D. praemorsa*, *D. proteoides* and *D. tridentata* are under threat of being depleted in the wild.

Table 2. Commercially exploited species of *Dryandra*. C = Cut flower. N = Nursery stock. S = Seed.

Species	Exploitation			Quantity harvested bunches or stems 1980/81
D. arborea			S	
D. armata			S	
D. ashbyi			S	
D. bipinnatifida			S	
D. calophylla	C		S	
D. carduacea	C		S	>1,000
D. carlinoides			S	
D. cirsioides	C		S	
D. drummondii	C			>10,000
D. falcata	C			
D. formosa	C	N	S	>30,000
D. fraseri			S	
D. hewardiana	C			
D. kippistiana			S	
D. mucronulata			S	
D. nana			S	
D. nivea	C		S	
D. nobilis	C	N	S	
D. obtusa	C			
D. patens			S	
D. plumosa	C			
D. polycephala	C	N	S	>30,000
D. praemorsa		N	S	
D. preissii			S	
D. proteoides			S	
D. pteridifolia	C	N	S	>1,000
D. quercifolia	C	N	S	>12,500
D. sessilis	C	N	S	
D. speciosa		N	S	
D. stuposa	C			
D. tenuifolia	C		S	
D. tridentata			S	

ACKNOWLEDGEMENTS

This study was partly funded by the Western Australian Department of Fisheries and Wildlife. Sincere thanks are extended to the Curators of the herbaria consulted for permission to examine specimens; to S.D. Hopper for making available unpublished data; to Emeritus Professor B.J. Grieve for providing access to an unpublished key to the species of *Dryandra*; to A.S. George and K.R. Newbey for providing valuable data and helpful comments; to A.J.M. Hopkins and N.G. Marchant for their assistance in the direction in the study and for providing constructive criticisms on the manuscript; and to N. Caputi who prepared Appendix 2.

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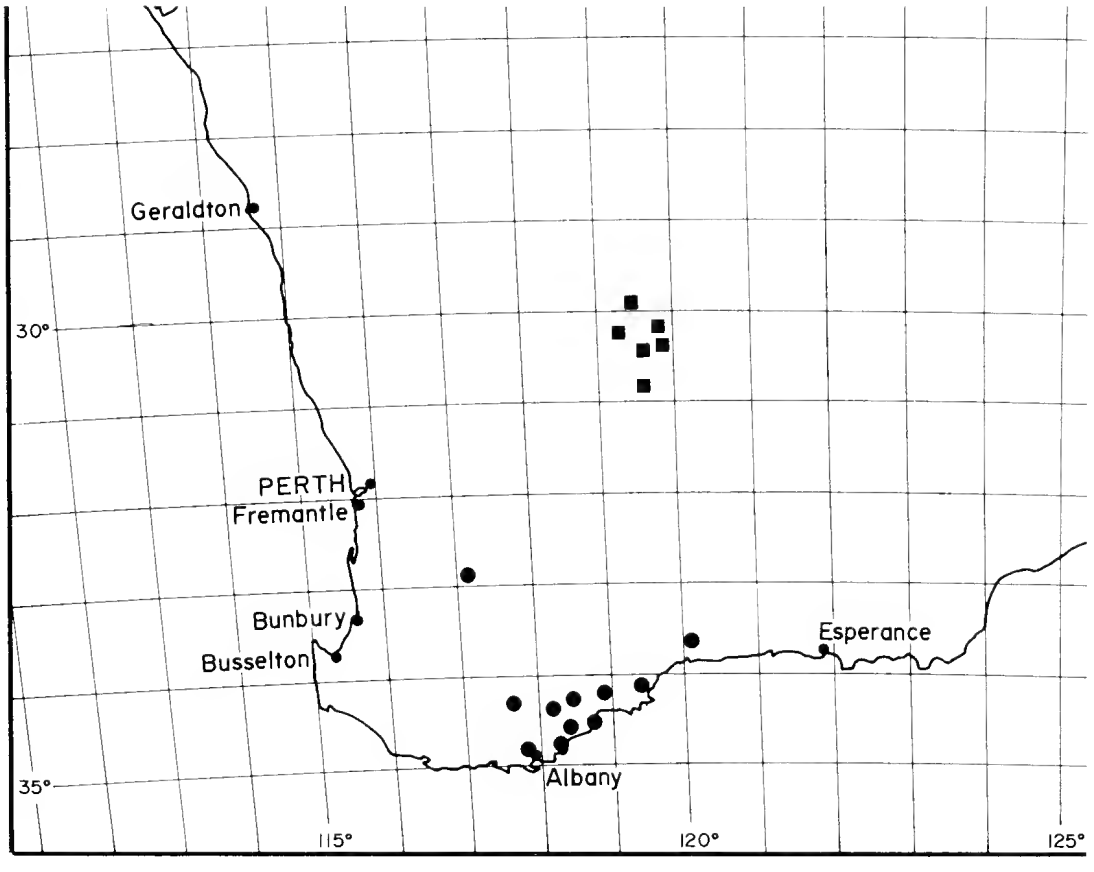
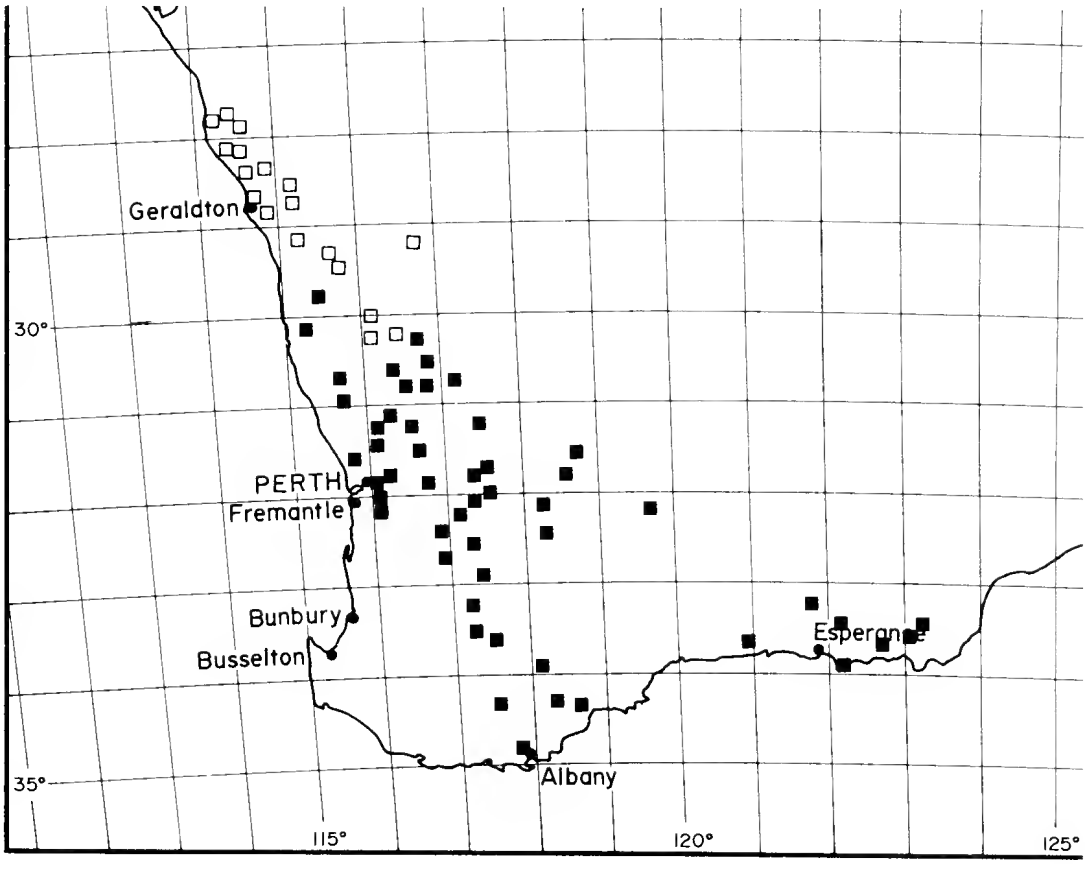
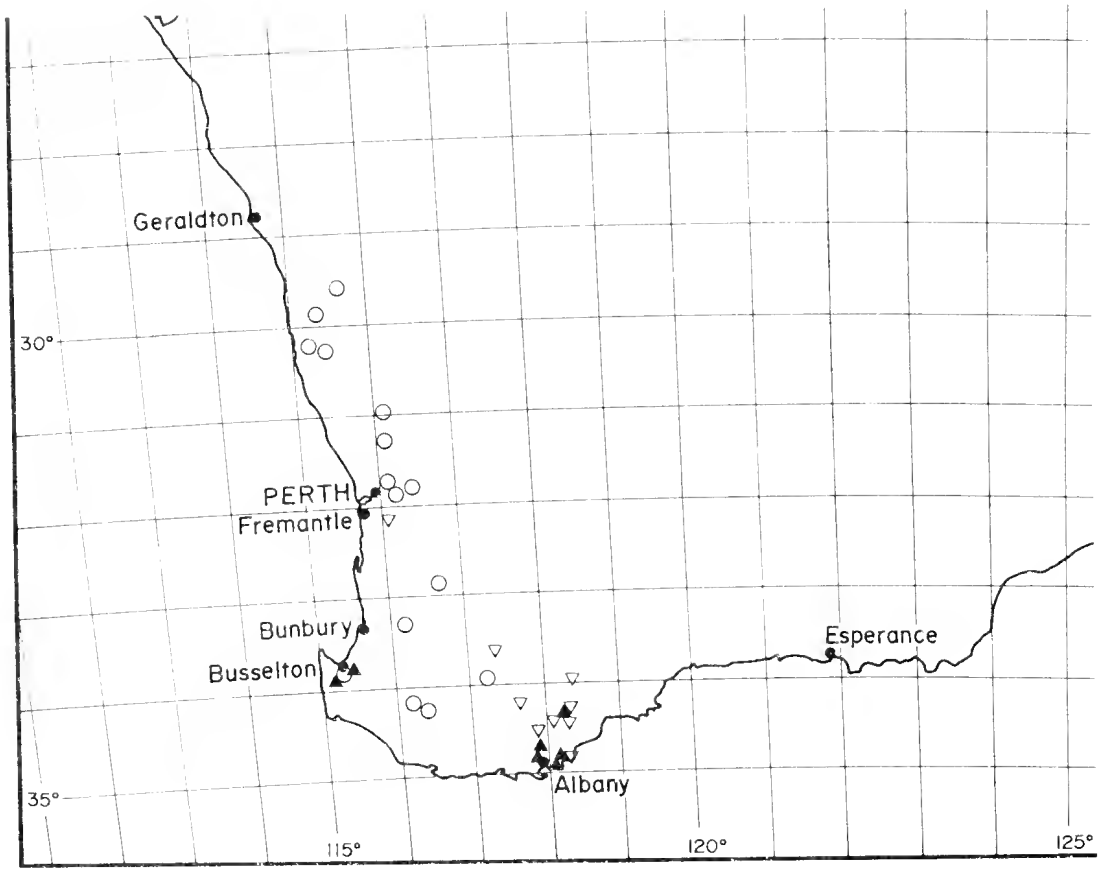


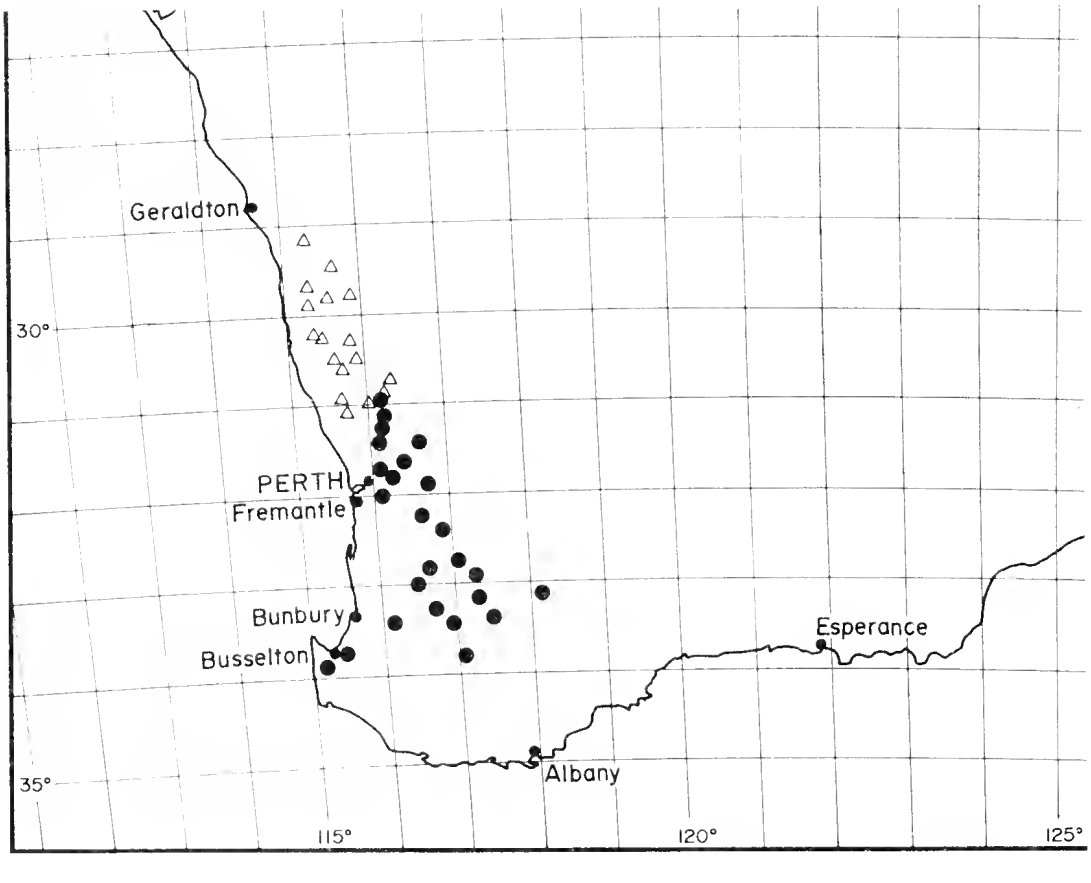
Map 4. *D. arborea* (■), *D. arctotidis* (●).



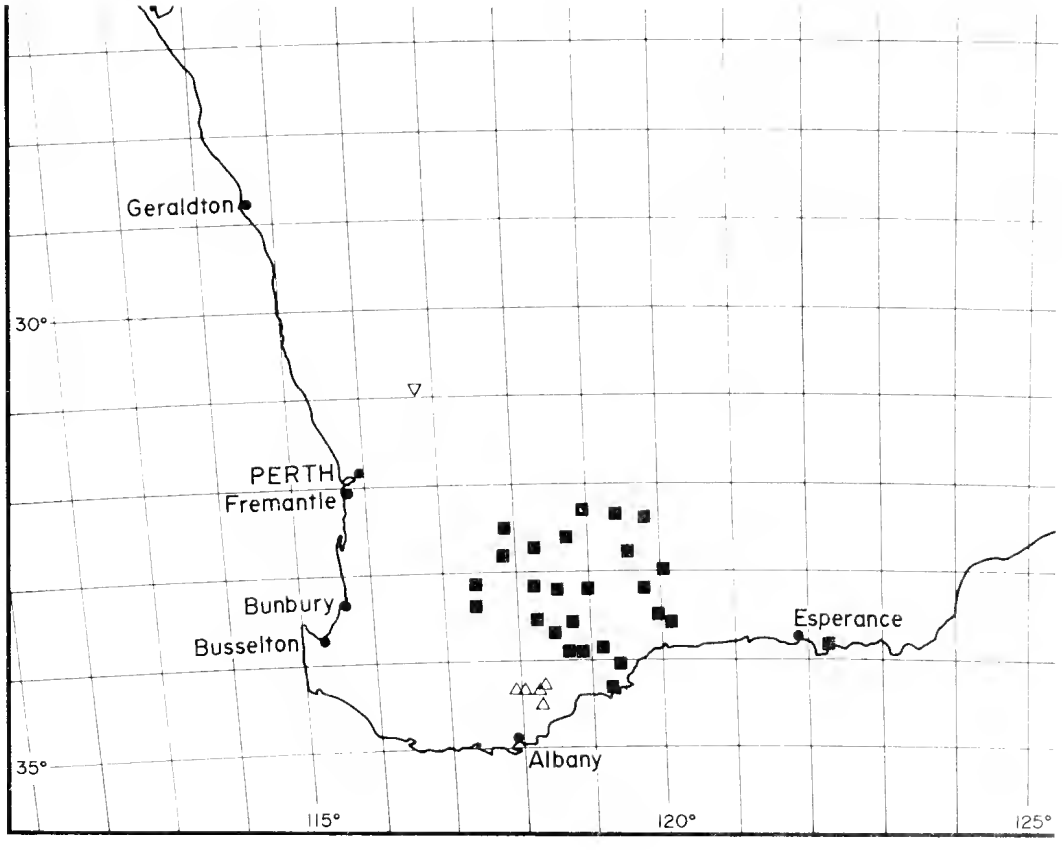
Map 5. *D. armata* (■), *D. ashbyi* (□).



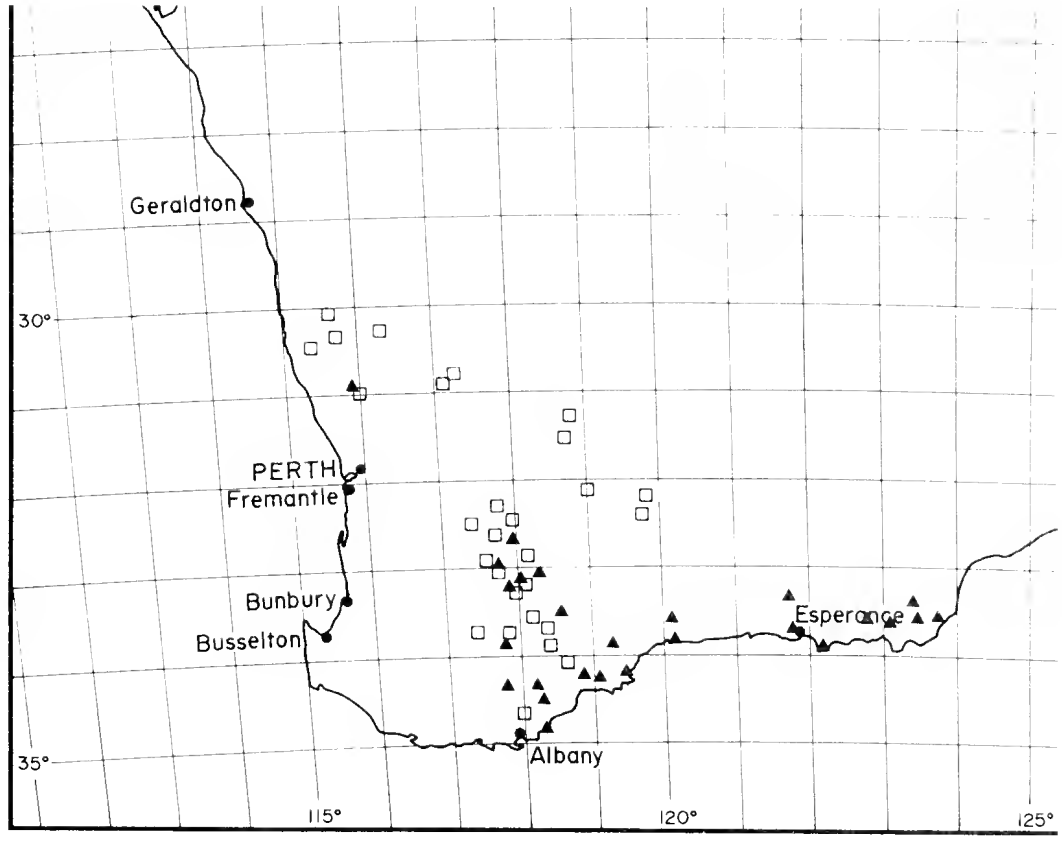
Map 6. *D. baxteri* (▲), *D. bipinnatifida* (○), *D. calophylla* (▽).



Map 7. *D. carduacea* (●), *D. carlinoides* (△).



Map 8. *D. cirsioides* (■), *D. comosa* (▽), *D. concinna* (△).



Map 9. *D. conferta* (□), *D. cuneata* (▲).

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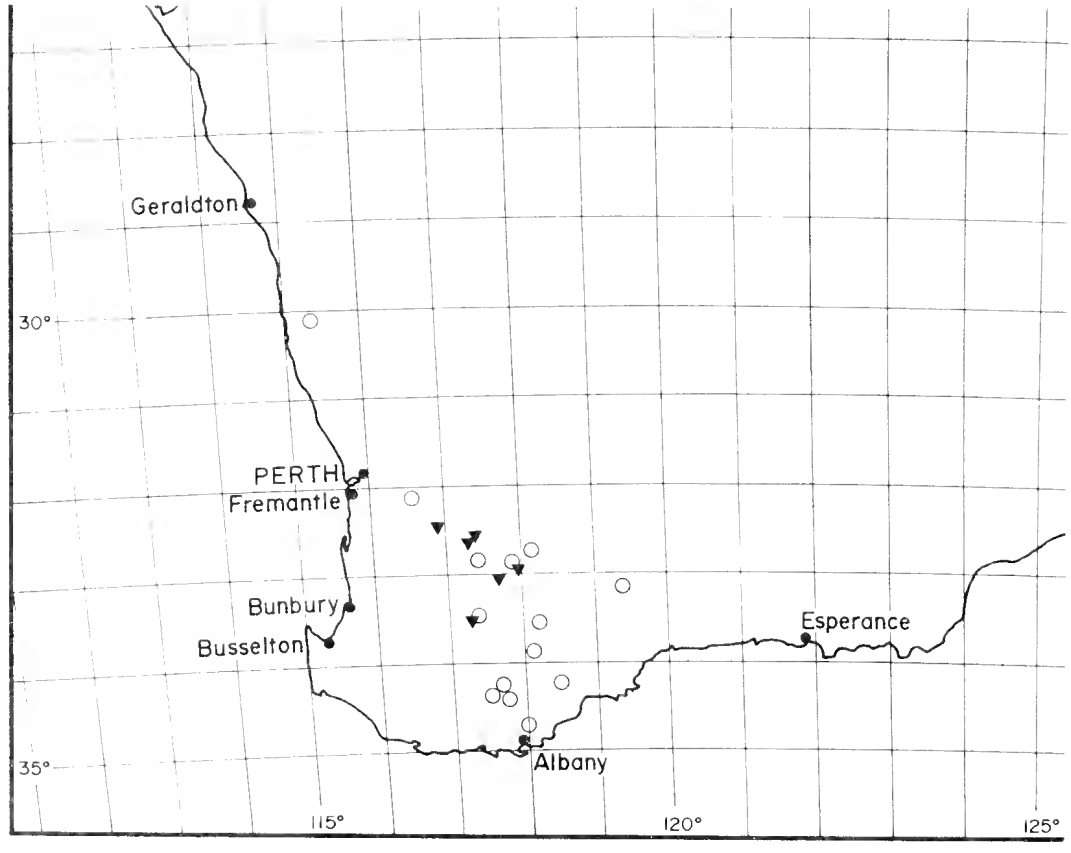
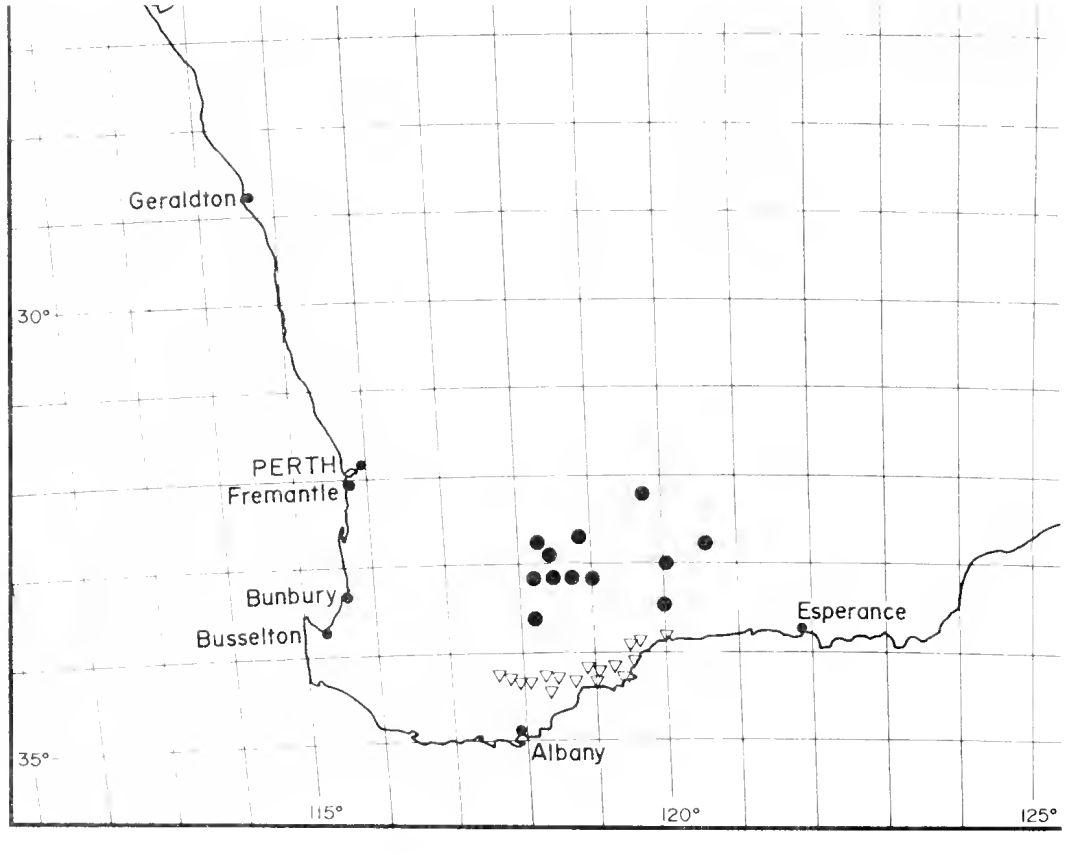
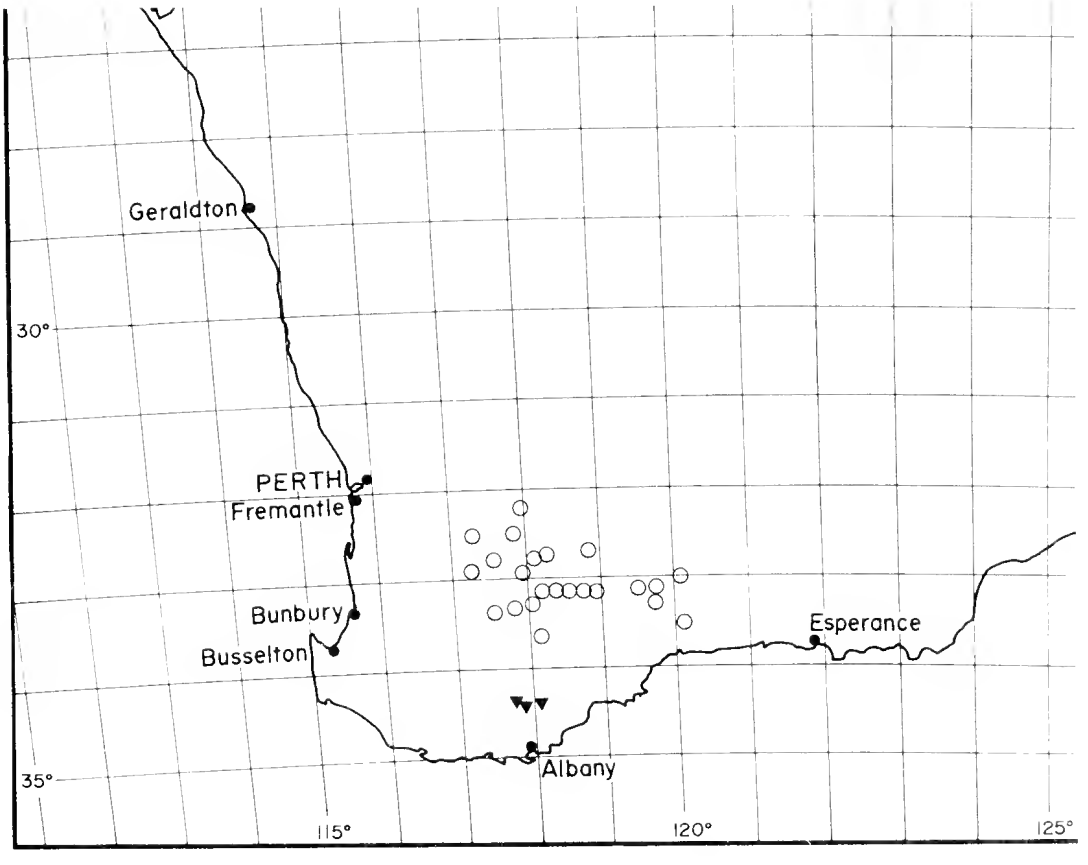


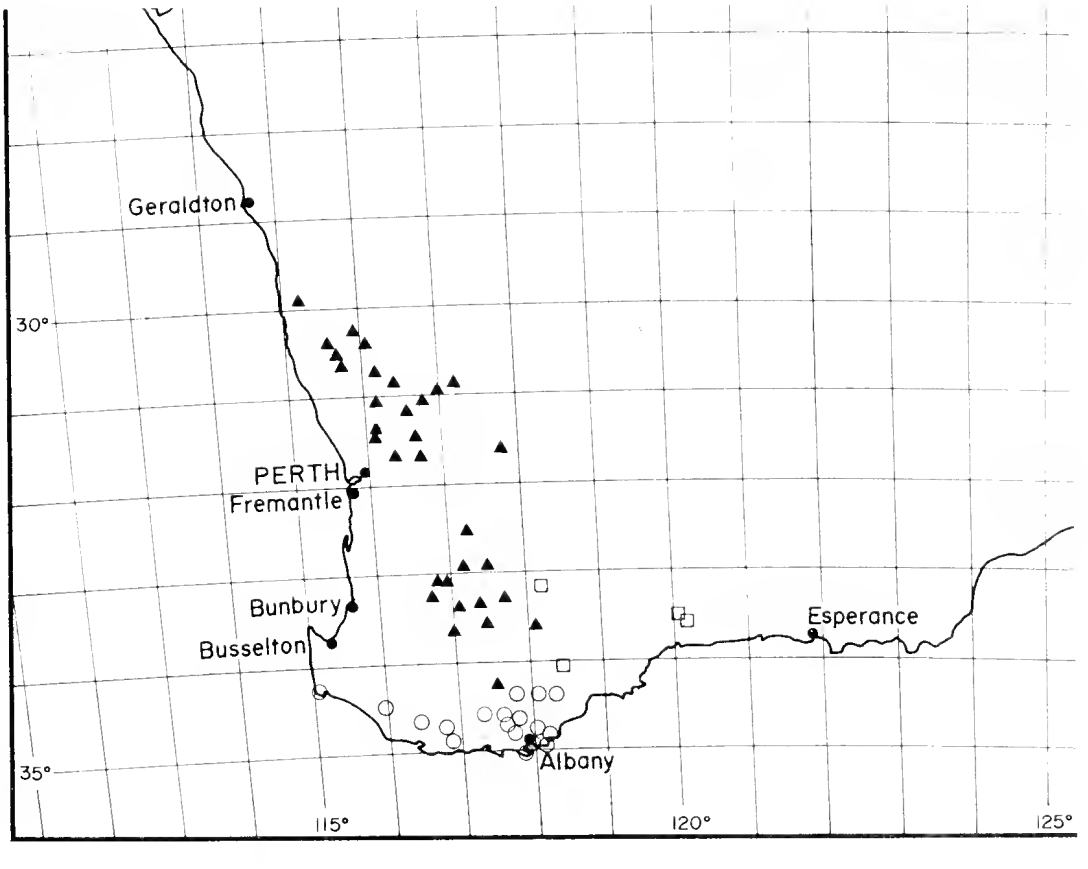
Map 10. *D. cynaroides* (▼), *D. drummondii* (○).



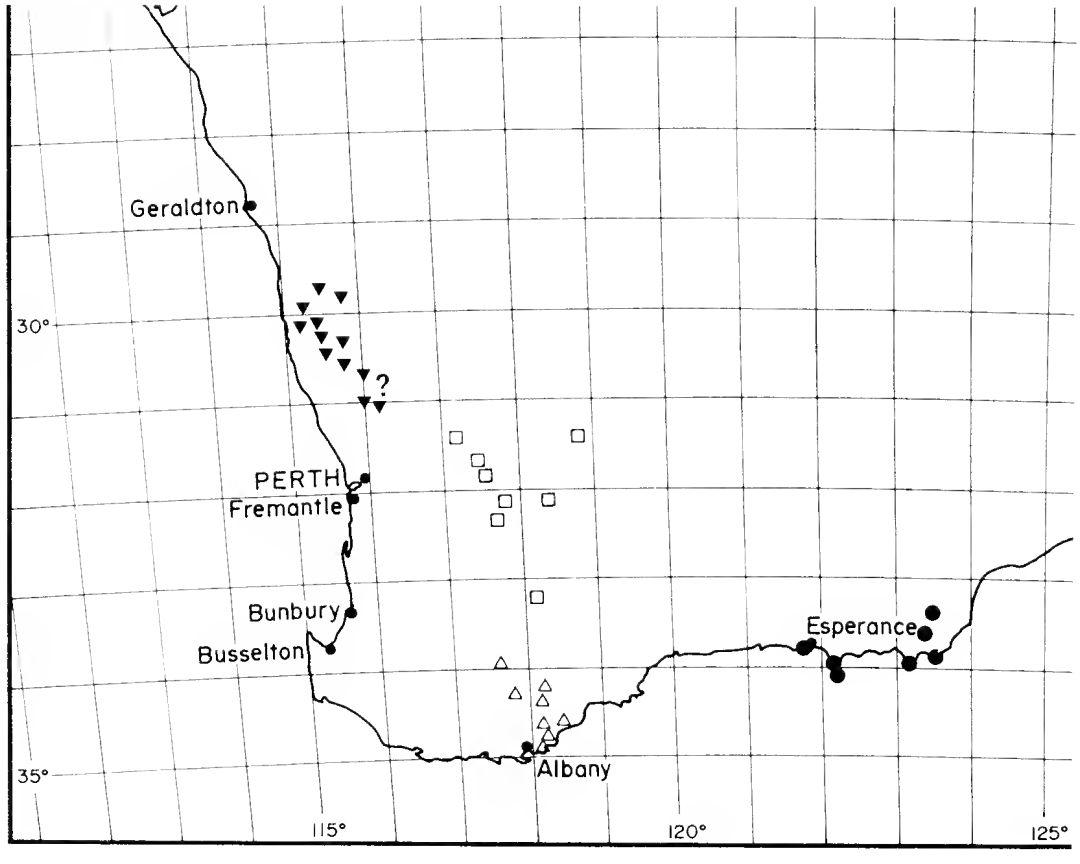
Map 11. *D. erythrocephala* (●), *D. falcata* (▽).



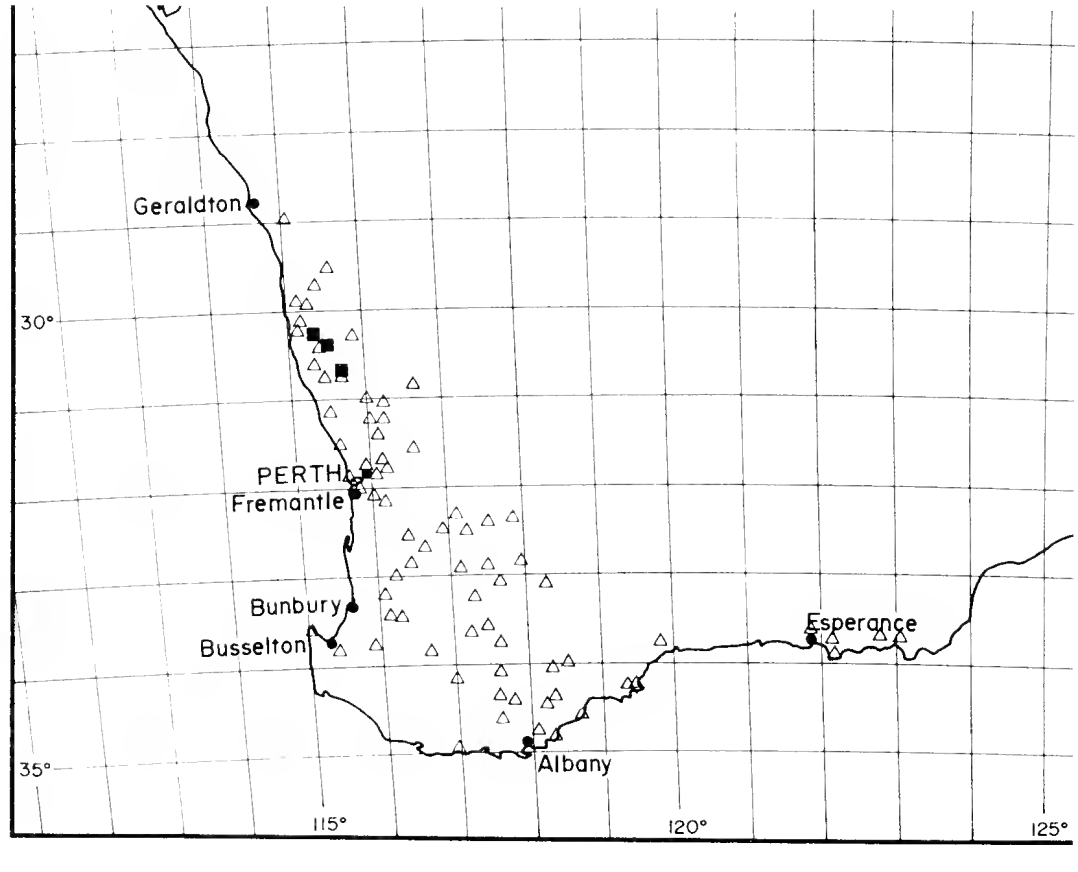
Map 12. *D. ferruginea* (○), *D. foliolata* (▼).



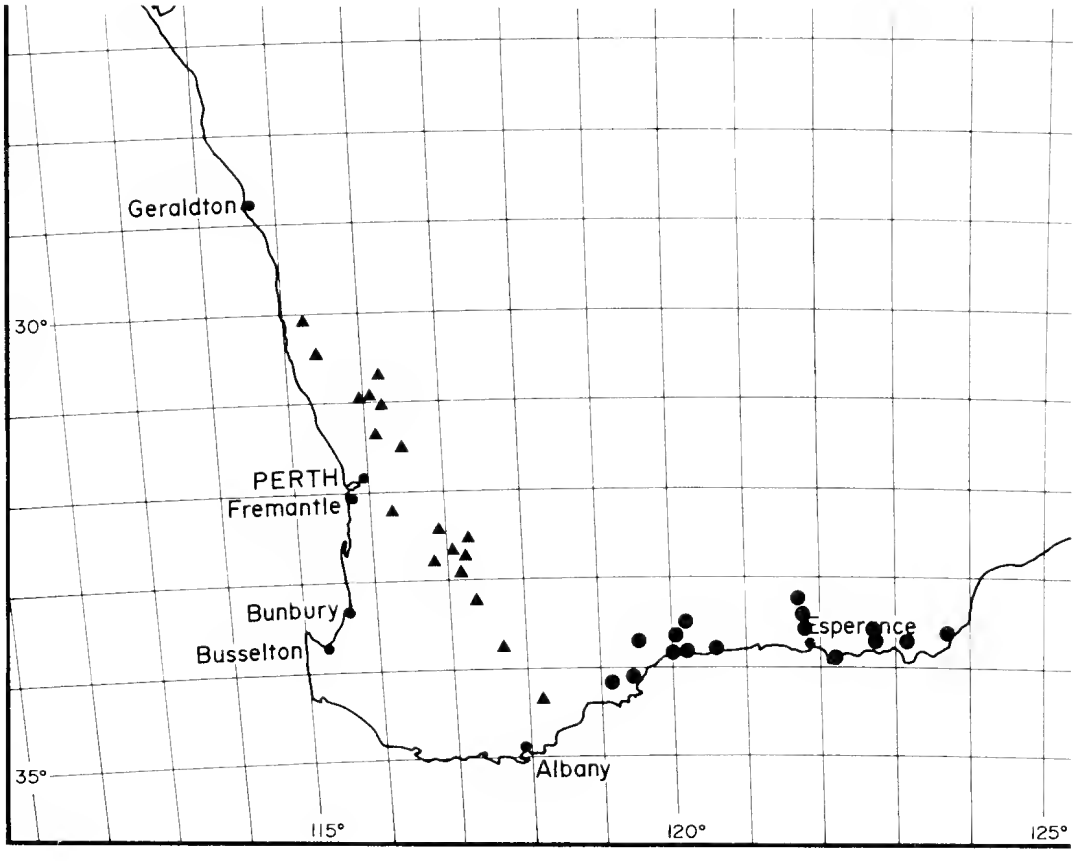
Map 13. *D. foliosissima* (□), *D. formosa* (○), *D. fraseri* (▲).



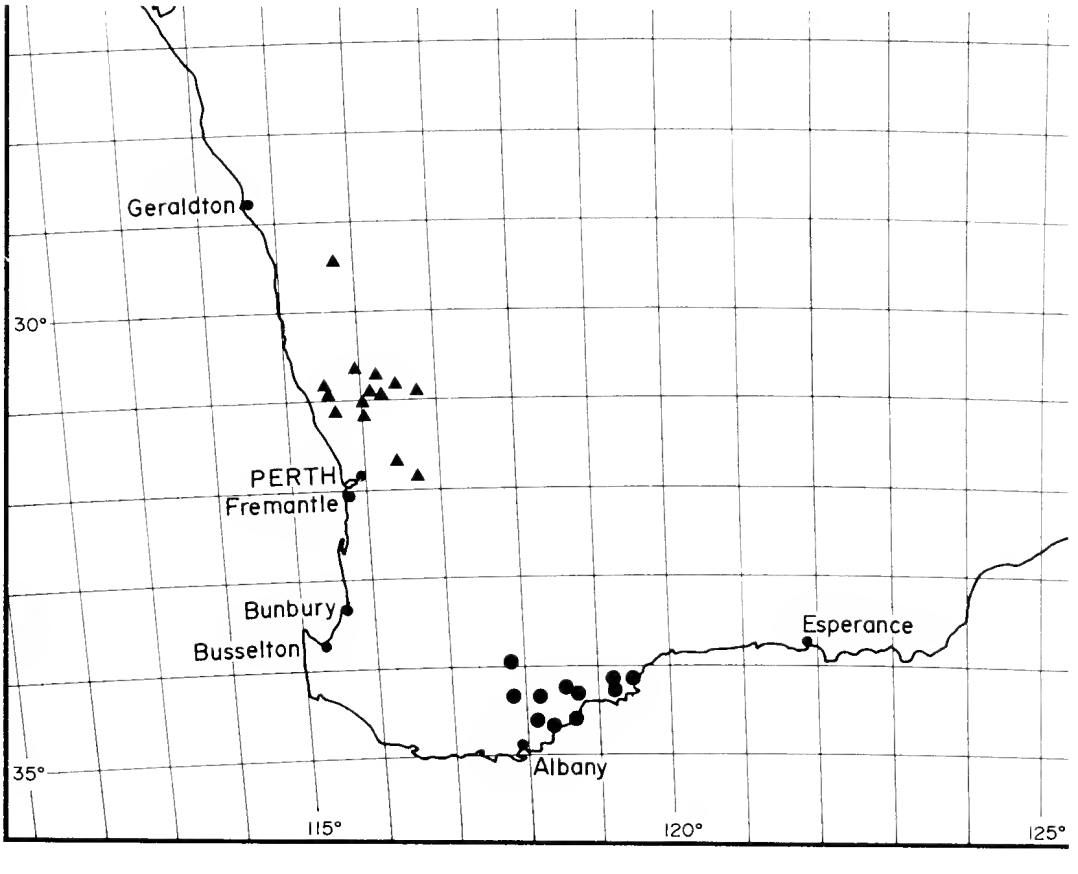
Map 14. *D. hewardiana* (?), *D. horrida* (□), *D. kippistiana* (▼), *D. longifolia* (●), *D. mucronulata* (△).



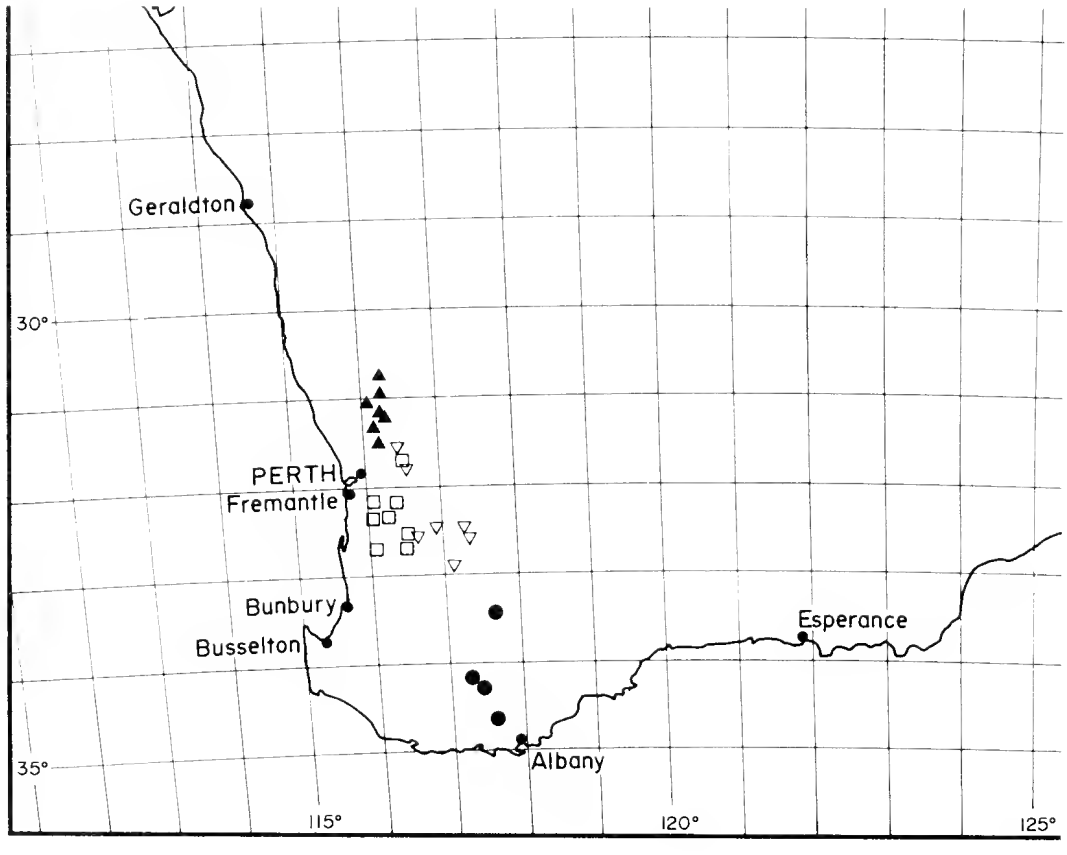
Map 15. *D. nana* (■), *D. nivea* (△).



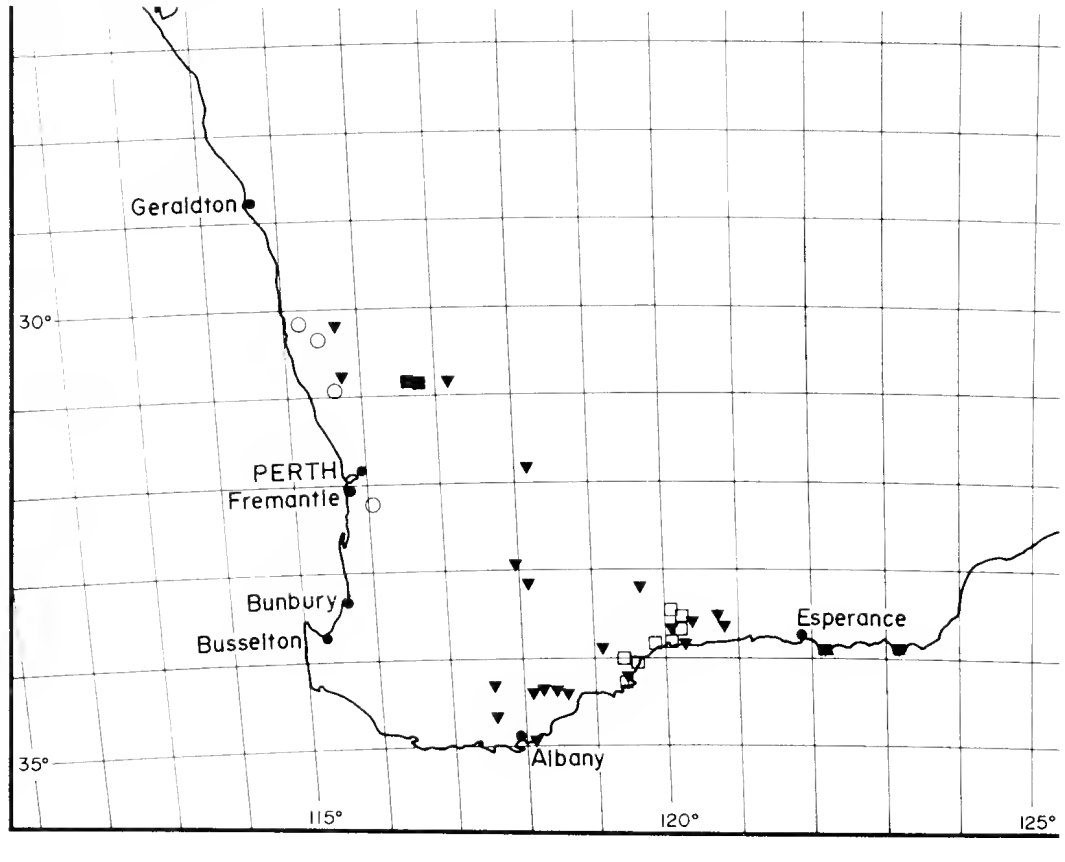
Map 16. *D. nobilis* (▲), *D. obtusa* (●).



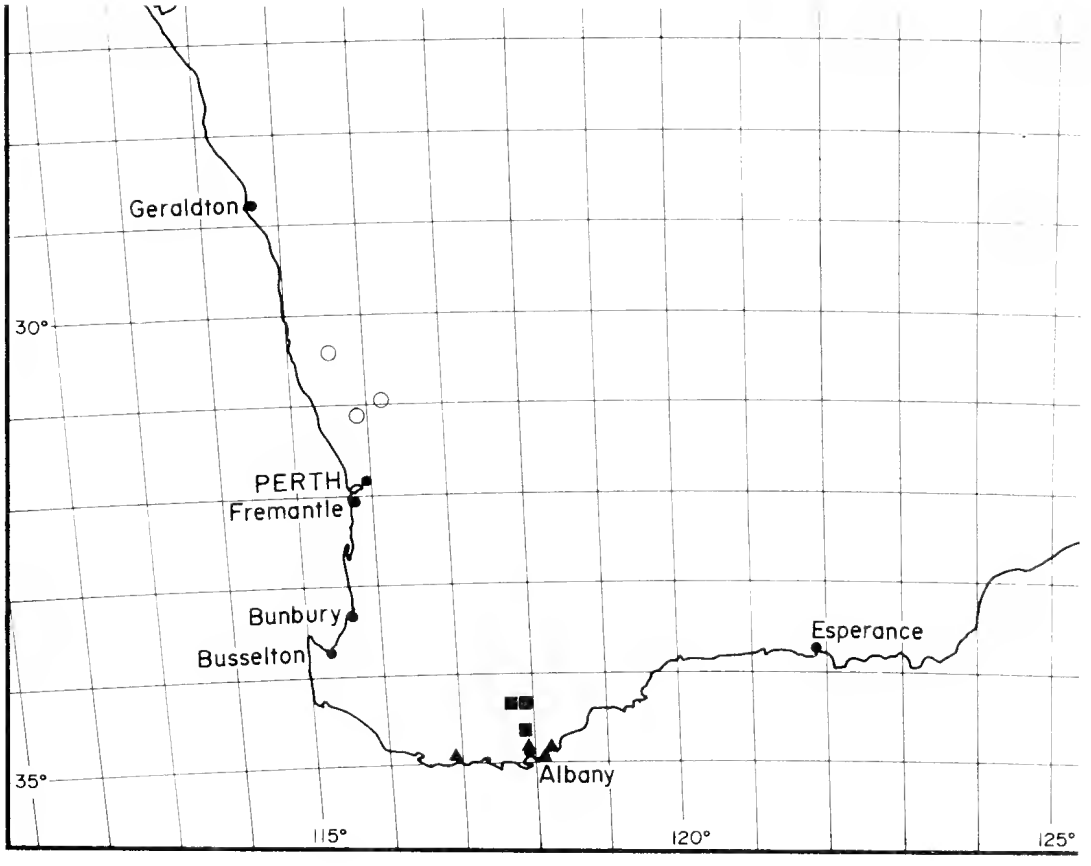
Map 17. *D. patens* (▲), *D. plumosa* (●).



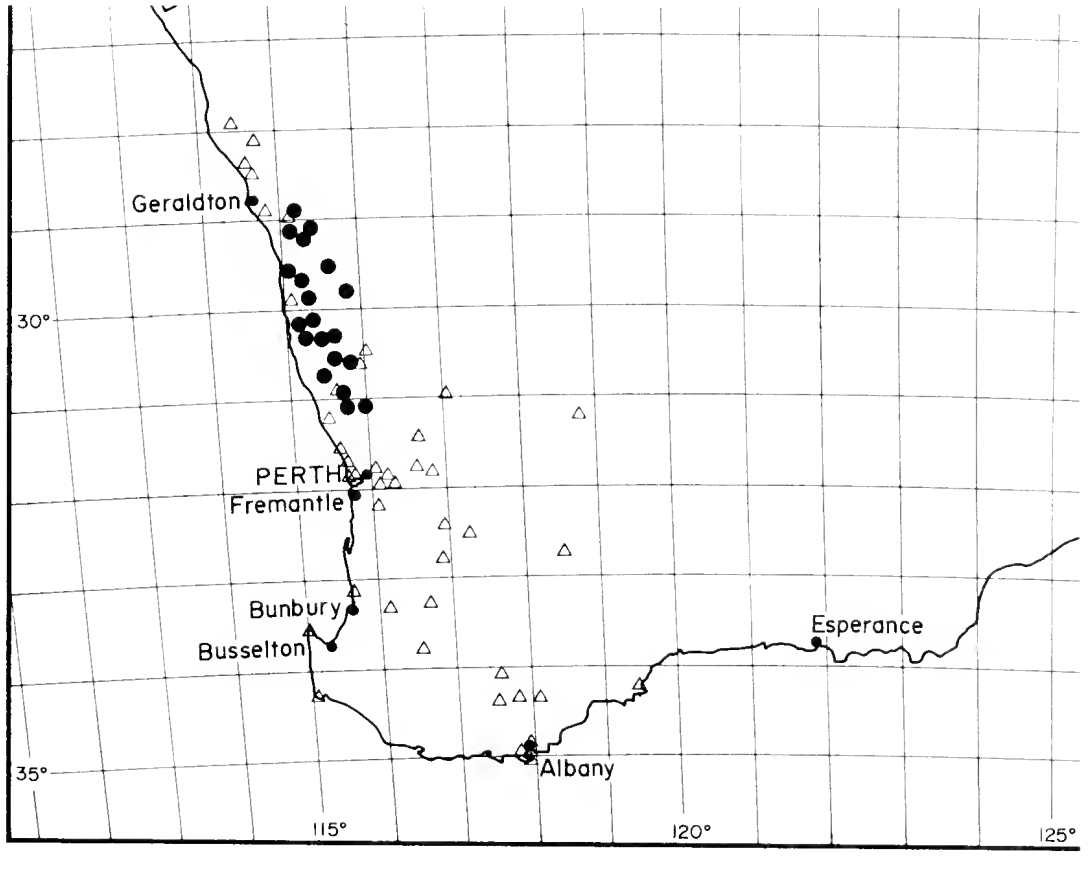
Map 18. *D. polycephala* (▲), *D. praemorsa* (□), *D. preissii* (●), *D. proteoides* (▽).



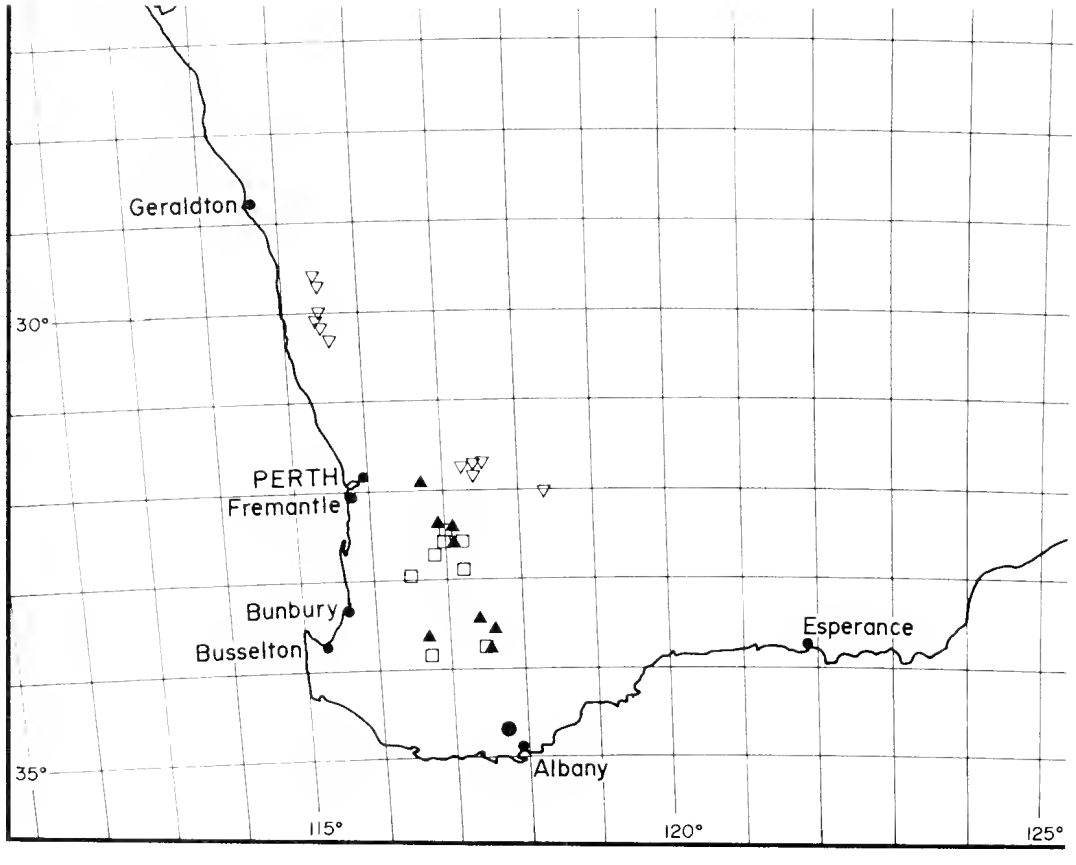
Map 19. *D. pteridifolia* (▼), *D. pulchella* (■), *D. quercifolia* (□), *D. sclerophylla* (○).



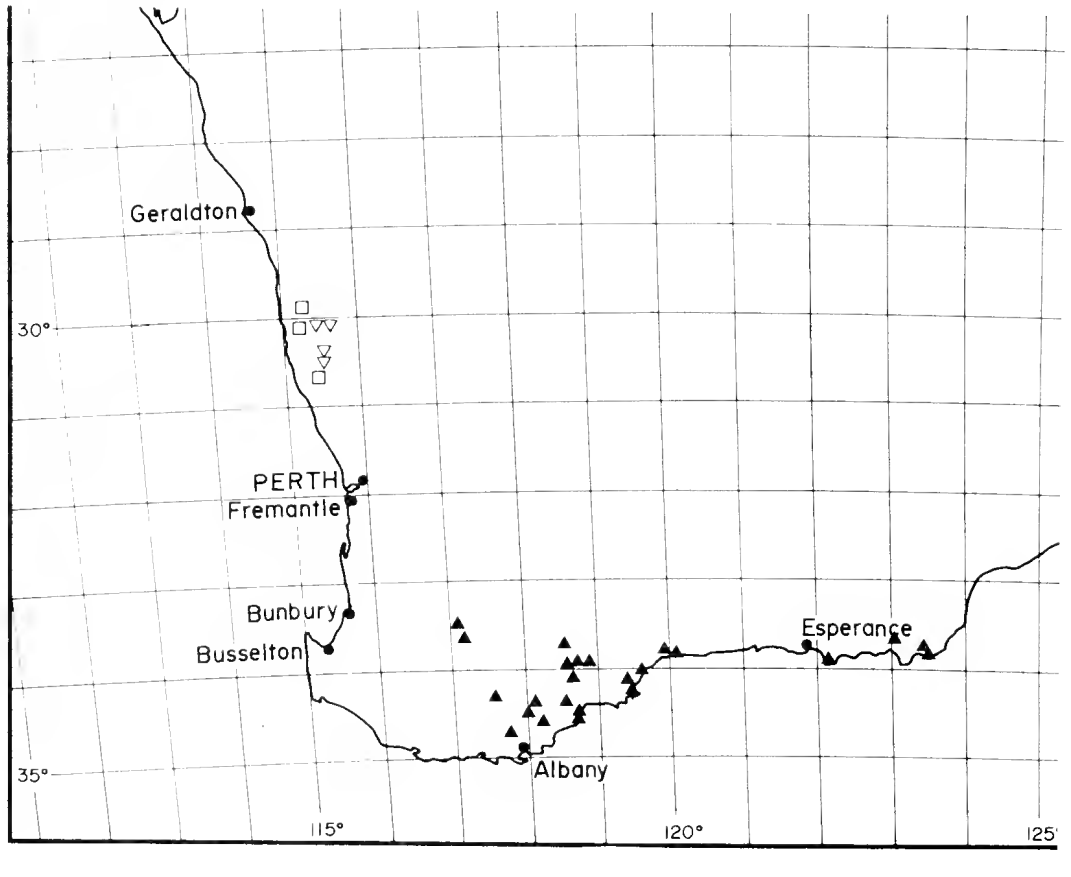
Map 20. *D. seneciifolia* (■), *D. serra* (▲), *D. serratuloides* (○).



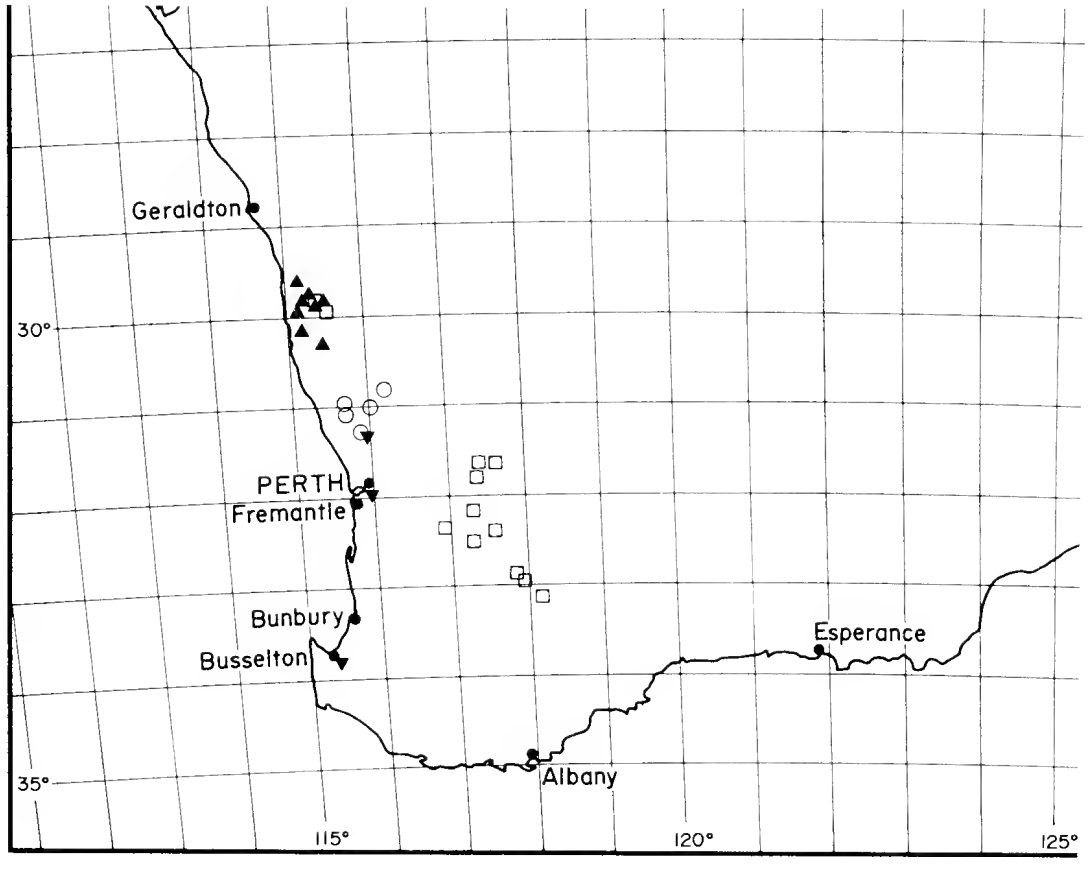
Map 21. *D. sessilis* (△), *D. shuttleworthiana* (●).



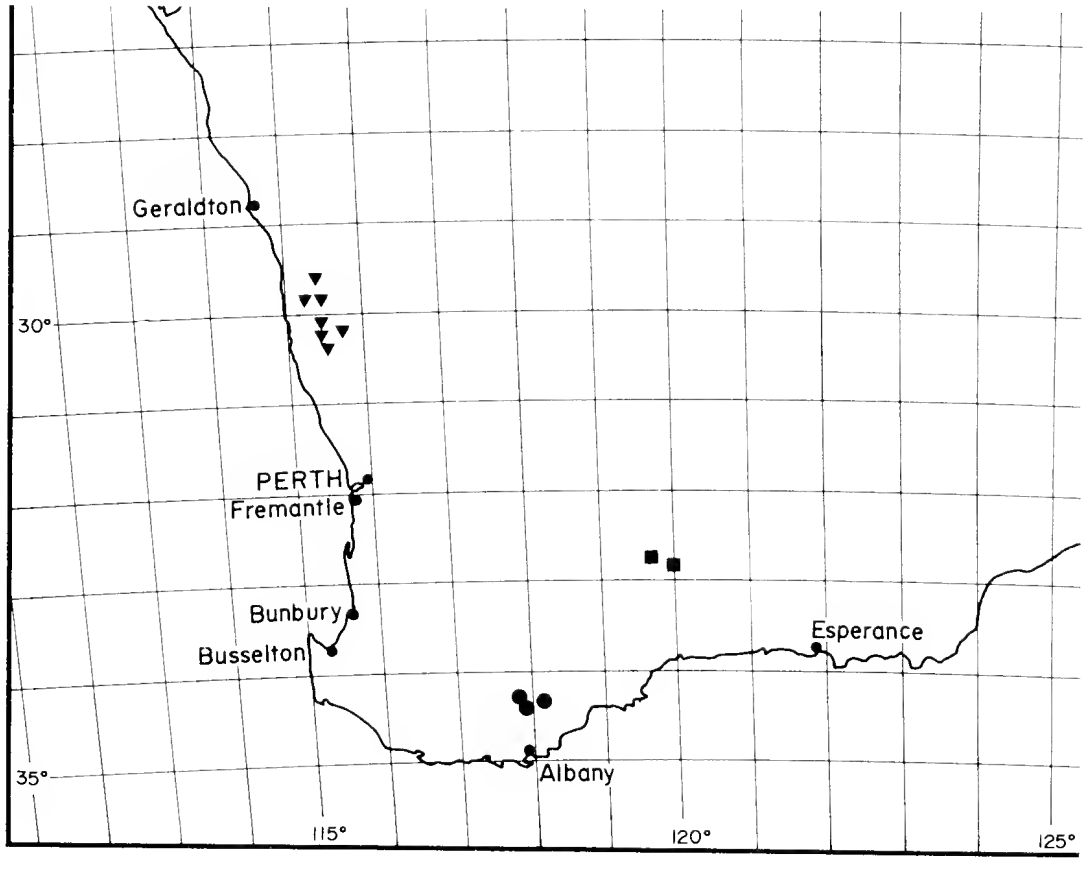
Map 22. *D. speciosa* (▽), *D. squarrosa* (●), *D. stuposa* (▲), *D. subpinnatifida* (□).



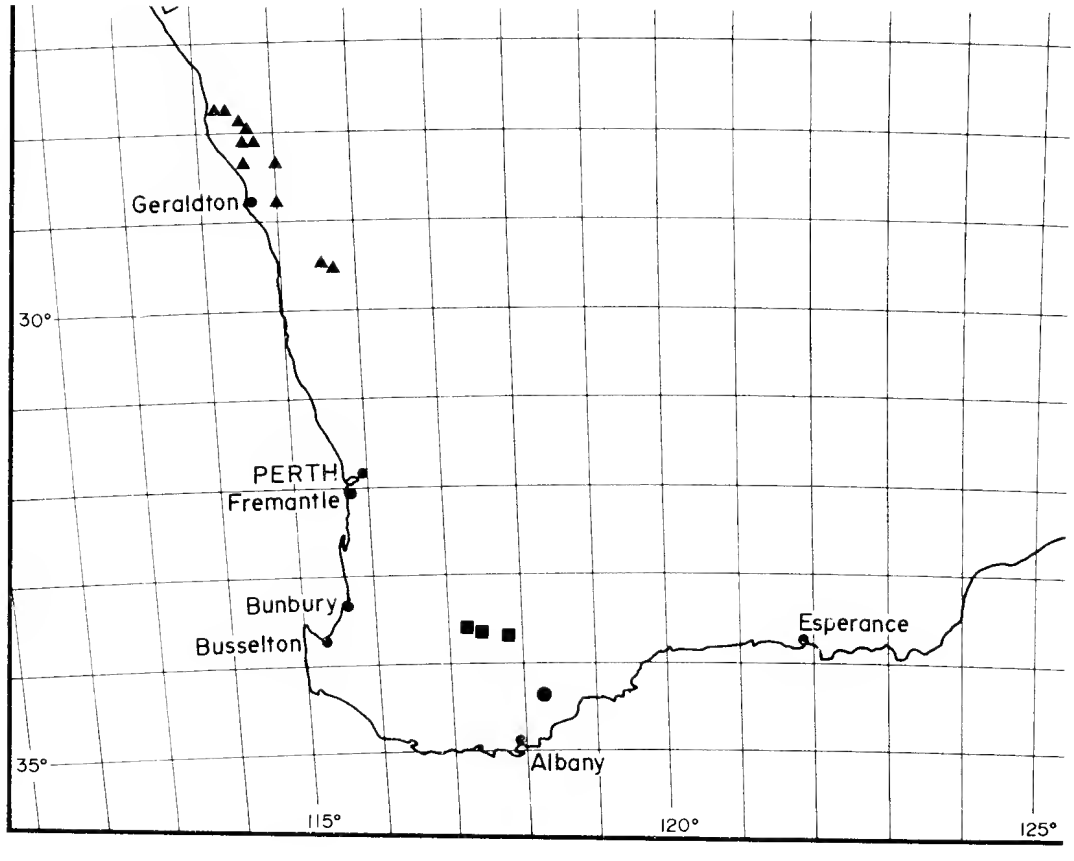
Map 23. *D. subulata* (▽), *D. tenuifolia* (▲), *D. tortifolia* (□).



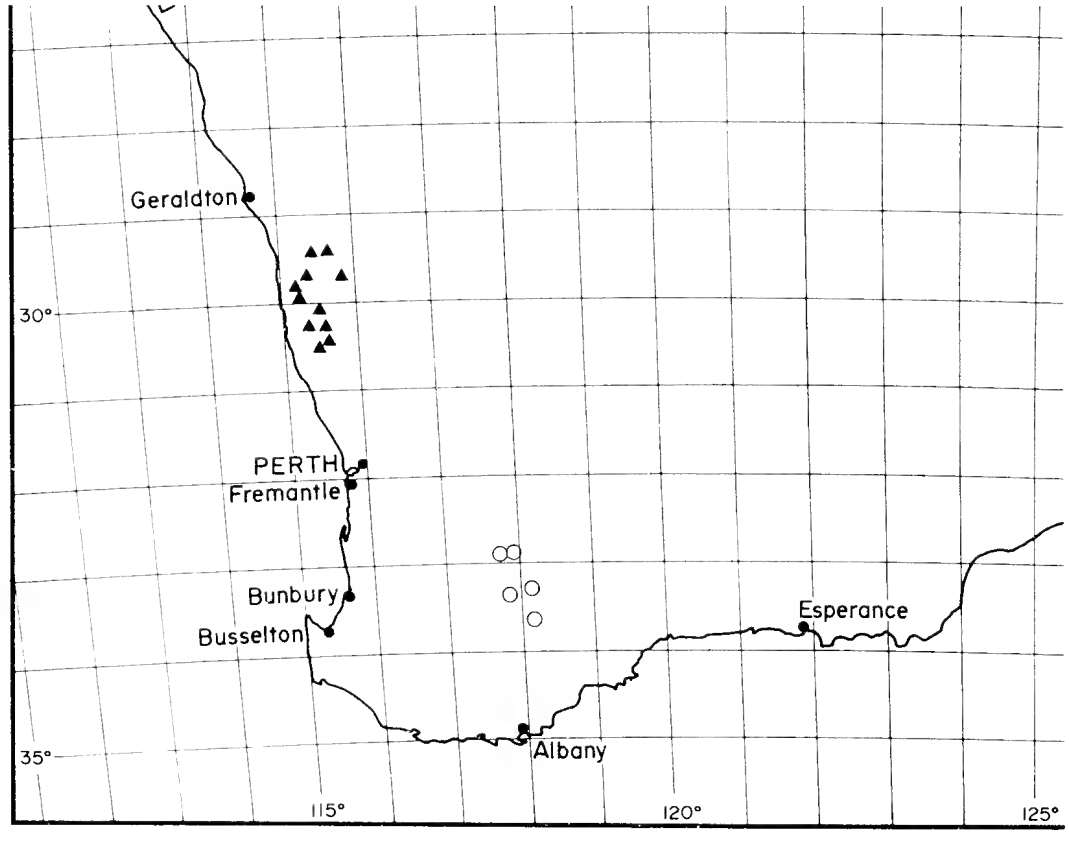
Map 24. *D. tridentata* (▲), *D. vestita* (□), *D.* sp. A (▼), *D.* sp. B (○).



Map 25. *D.* sp. C (▼), *D.* sp. D (■), *D.* sp. E (●).



Map 26. *D.* sp. F (●), *D.* sp. G (■), *D.* sp. H (▲).



Map 27. *D.* sp. I (▲), *D.* sp. J (○).

APPENDIX 1

Notes on the morphology, ecology and conservation status of *Dryandra* species

Where all specimens of the one species examined appeared to conform reasonably well morphologically with the type specimen, no special notes are provided. Where the variation observed suggested heterogeneity, notes are provided.

Ecological notes provided include:-
S Soil types (from specimen labels)
V Vegetation types (from specimen labels)
F Flowering months (from specimen labels)
C Conservation status (inferred from herbarium data and observations).

Conservation status was expressed using the two schemes shown below. The assessment of status for each species was based upon current studies, and may differ from those given elsewhere.

First mention - Marchant and Keighery (1979)

Number = number of specimens in the Western Australian Herbarium (PERTH)
B = rare
C = represented in PERTH only by the type
D = poorly collected, less than 5 collections in PERTH
E = restricted to localities less than 100 km apart
F = restricted to localities less than 160 km apart
G = none of above

Second mentioned - Leigh et al. (1981)

1 = species known only from type collection
2 = species with very restricted distribution in Australia and with a maximum geographic range of less than 100 km
3 = species with a range over 100 km in Australia but occurring only in small populations which are mainly restricted to highly specific habitats
0 = non of above
X = species presumed extinct
E = endangered species in serious risk of disappearing from the wild state within one or two decades if present land use or other casual factors continue to operate
V = vulnerable species not presently endanged but at risk over a longer period through continued depletion, or which largely occur on sites likely to experience changes in land use which would threaten the survival of the species in the wild
R = species which are rare in Australia but which are not currently considered endangered or vulnerable
K = poorly known species that are suspected, but not definitely known to belong to any of the above categories
C = species known to be represented within a national park or other proclaimed reserves

D. arborea C.A.Gardner
S ironstone and jasperlite ridges
V scrub
F August-October
C 16F, 3V

D. arctotidis R.Br.
Bentham (1870) considered *A. arctotidis* to include *D. tortifolia* as a variety. There were a few differences in leaf and flower indumentum between these taxa. They were geographically separated and although considered as separate species here, *D. tortifolia* may be a subspecies of *D. arctotidis*.
S sand, gravel
V Wandoo woodland, mallee heath, heath
F August-October
C 17G, OC

D. armata R.Br.
There was considerable morphological variation in this species, particularly in the leaves and in the floral bracts. Many specimens included under *D. armata* here have previously been considered to be *D. cirsioides*, an apparently closely related species. Two distinct, undescribed species, *D.* sp. E and *D.* sp H, have been recognised from the confusion betwen *D. armata* and *D. cirsioides*. Separate recognition of *D. favosa* Lindl., *D. gilbertii* S.Moore or *D. purdieana* Diels was not possible at this stage of study. However these or other taxa could probably be recognised when a thorough revision of the genus is made.
S gravel, sand, clay-loam
V heath, shrubland, mallee heath, Wandoo woodland
F June-November
C > 20G, OC

D. ashbyi B.L.Burtt
D. ashbyi was closely related to *D. fraseri*. However, as noted by Burtt (1939), there appeared to be specimens with leaf shape and bract indumentum intermediate between these species. For this study, such intermediates, which came from the Dandaragan to Greenough River area, were included under *D. fraseri*. *D. ashbyi* may prove to be a subspecific taxon.
S lateritic gravel, sandy clay-loam, yellow sand
V heath, shrubland
F June-September
C > 20G, OC

D. baxteri R.Br.
Two geographically well separated populations of *D. baxteri* occur in the Busselton and Albany areas. No consistent differences in morphology between these populations were observed.
S gravel, sand, sometimes moist
V *Banksia-Eucalyptus* heath, Jarrah forest
F July-October
C 14G, OC

D. bipinnatifida
The northern populations of *D. bipinnatifida* have consistently narrower leaf segments than the southern populations.
S sandy lateritic gravels
V heath, Jarrah forest
F October-November
C 18G, OC

D. calophylla R.Br.
S sand, clay over laterite
V scrub
F October-November
C 10G, 3C

D. carduacea Lindl.
There were wide variations in the leaf size, although the relative size of the lobes seemed constant. See also *D. squarrosa* and *D.* sp. G.
S sandy lateritic gravels, sand over gravel
V heath
F July-November
C > 20G, OC

D. carlinoides Meisn.
S sandy lateritic gravels, sand over gravel
V heath
F September-October
C > 20-, C

D. cirsioides Meisn.
There were wide variations, particularly in leaf and lobe dimensions. See notes on *D. armata*. Several taxa may be recognisable here, although easy separation was not possible at this stage. Specimens closest to the type occur between Lake Grace and Fitzgerald River; a broadleaved form with short lobes between Lake Grace and Ravensthorpe; and another form between Kulin and Lake King.
S sand, gravel, clay-loam
V heath, scrub, mallee heath
F April-October
C > 20G, OC

D. comosa Meisn.
S lateritic hills and slopes
V shrubland
F July-August
C 6E, 2RC

D. concinna R.Br.
S shale, gravel
V scrub heath, mallee heath
F August-October
C 10E, 2C

D. conferta Benth.
There was a variation in form. Two geographically restricted forms (one in the Northern Sandplains and another near Pingelly) could be distinct subspecific taxa.
S sand, sandy gravel
V heath, shrubland, mallee heath, Wandoo woodland
F May-October
C > 20G, OC

D. cuneata R.Br.
S sand, sandy gravel, shale
V heath, mallee heath
F May-October
C > 20G, OC

D. cynaroides C.A.Gardner
S sand, sandy gravel
V heath, shrubland
F October-November
C 9F, 3VC

D. drummondii Meisn.
Distinctly outlying populations of *D. drummondii* occurred in the Badgingarra area.
S lateritic gravel, sandy loam
V heath, woodland
F August-October
C 19G, OC

D. erythrocephala C.A.Gardner
S sand, lateritic gravel
V heath, scrub, mallee
F September-November
C 20G, OC

D. falcata R.Br.
D. falcata was reasonably uniform in morphology over its range. A closely related taxon *D.* sp. C occurred in the Eneabba area.
S sand, clay, shale, gravel
V heath, scrub, mallee
F September-November
C 20G, OC

D. ferruginea Kipp. ex Meisn.
S lateritic gravel, sandy loam
V heath, shrubland, thicket
F June-December
C > 20G, OC

D. foliolata R.Br.
S sandy, peaty sand
V *Banksia* heath
F October-December
C 6E, 2C

D. foliosissima C.A.Gardner
S gravelly sand, granite
V scrub
F May-October
C 8G, 3KC

D. formosa R.Br.
A distinctly outlying population of *D. formosa* occurred in the Augusta area.
S sandy, peaty sand, granite, laterite
V shrubland, mallee heath
F May-December
C > 20G, 3C

D. fraseri R.Br.
(See notes under *D. ashbyi*)
S sandy lateritic gravel, sandy loam
V heath, scrub, Wandoo woodland, Jarrah forest
F June-October
C > 20G, OC

D. hewardiana Meisn.
The identity of *D. hewardiana* was not well known. No specimens in PERTH agreed exactly with the type. One specimen annotated by A.S. George as being similar to the type appeared more closely related to *D. patens* in the indumentum on the involucral bracts. These species were very closely related and may prove synonymous, in which case *D. hewardiana* would have priority. *D. patens* was preferred here as the specimens were closer to its type. No ecological information was known for *D. hewardiana*.

D. horrida Meisn.
S gravelly sand, yellow sand
V heath, *Allocasuarina* scrub
F February-June
C 11G, 3V

D. longifolia R.Br.
S sand over granite or limestone
V heath, shrubland
F May-November
C 19F, 3C

D. mucronulata R.Br.
S gravel, clay
V heath, scrub
F May-October
C 19F, 3C

D. nana Meisn.
S lateritic gravel
V heath, scrub
F August-November
C 9E, 2C

D. nivea (Labill.) R.Br.
Considerable variation in morphology was noted under *D. nivea*, although separation of these into distinct taxa proved too difficult for this study. Leaf and lobe size appeared to be the most variable characters, but variations in habit and inflorescences also occurred. In some areas of its range it was possible to recognise distinct geographically confined forms.
S sandy clay, sand, lateritic gravel, granite soils, limestone, swampy
V heath, shrubland, woodland, forest
F August-October
C > 20G, OC

D. nobilis Lindl.
Distinctly outlying populations of *D. nobilis* occurred in the Badgingarra area and these had smaller leaf lobes than the type.
S lateritic gravel, sandplain
V heath, shrubland, Wandoo woodland
F June-October
C > 20G, OC

D. obtusa R.Br.
S sand, gravel
V heath, scrub, mallee heath
F August-October
C > 20G, OC

D. patens Benth.
See notes on *D. hewardiana*. An undescribed species, *D.* sp. I, closely related to *D. patens* occurred in the Eneabba area.
S lateritic gravel
V heath, thicket, open woodland
F August-November
C > 20G, 3V

D. plumosa R.Br.
S gravel loam, sand over laterite
V heath, mallee, scrub
F August-November
C 15F, OC

D. polycephala Benth.
S sandy gravel, gravel loam
V woodland, forest
F July-November
C 18E, 2E

D. praemorsa Meisn.
S lateritic gravel, granite
V Jarrah forest
F July-October
C 12F, 3V

D. preissii Meisn.
S gravel loam
V Wandoo woodland, mallee heath
F September-October
C 7B, 2V

D. proteoides Lindl.
S lateritic gravel
V Powderbark wandoo woodland, scrub
F July-September
C 7G, 3CV

D. pteridifolia R.Br.
Outlying populations of *D. pteridifolia* occurred at the northern limit of its range.
S gravel, sandy clay, loam
V heath, shrubland, mallee heath, Wandoo woodland
F September-November
C > 20G, OC

D. pulchella Meisn.
S gravel loam, red clay
V mallee shrubland, woodland
F October-? November
C 7E, 2RC

D. quercifolia Meisn.
S lateritic gravel, quartzite, sandplain
V Scrub, thicket, mallee heath
F April-December
C > 20G, OC

D. sclerophylla Meisn.
A specimen with a collecting locality of 'Wongong' (near Perth) seemed to be an error as *D. sclerophylla* appeared to be restricted to the Eneabba-Moore River area.
S shallow grey sand over laterite
V heath
F September-October
C 10F, 3C

D. seneciifolia R.Br.
S gravelly sands, shale
V shrubland
F July-October
C 4E, 2C

D. serra R.Br.
S sandy gravel
V shrubland
F August-November
C 9F, 3V

D. serratuloides Meisn.
D. sp. J, an undescribed species closely related to *D. serratuloides*, occurred in the Dumbleyung area.
S sandy gravel
V mallee heath
F July-October
C 4B, 2E

D. sessilis (Knight) Domin
D. sessilis was a widespread species and appeared to have a variety of geographically related leaf size forms.
S lateritic gravel, sand, granite, limestone
V heath, shrubland, woodland
F April-November
C > 20G, OC

D. shuttleworthiana Meisn.
S sand, lateritic gravel
V heath
F June-September
C > 20G, OC

D. speciosa Meisn.
Distinctly disjunct populations of *D. speciosa* occurred in the Badgingarra and Tammin areas, though only the flower colour appeared to differ.
S sandy, gravel, laterite
V heath, shrubland, mallee heath
F June-September
C > 20G, 3VC (Badg. pop. 7E, 2VC; Tamm. pop. > 20F, 3EC)

D. squarrosa R.Br.
D. squarrosa appeared to be closely related to *D. carduacea* and *D.* sp. G. Only one specimen at PERTH was considered to conform reasonably with the type description.
S ? gravel
V woodland
F ? - August - ?
C 1B, 2EC

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D. stuposa Lindl.
S sandy lateritic gravel
V scrub, powderbark wandoo woodland
F July-November
C 9G, 3VC

D. subpinnatifida C.A.Gardner
S gravel loam
V scrub
F September-November
C 10F, 3VC

D. subulata C.A.Gardner
S sand, sandy lateritic gravel
V heath, scrub, mallee heath
F August-October
C 10E, 2C

D. tenuifolia R.Br.
D. tenuifolia varied in leaf shape and habit across its range. Coastal specimens had lobes along almost the complete length of the leaf, and were clumped shrubs with ascending branches. Specimens from around Ongerup and Jerramungup had few lobes along the leaf which had a very long petiole and were generally prostrate shrubs or with subterranean stems. These differences may lead to subspecific segregation.
S sandy loam, lateritic clay, sandstone, granite
V heath, mallee scrub
F May-November
C > 20G, OC

D. tortifolia Kipp. ex Meisn.
See notes on *D. arctotidis*.
S sand over lateritic gravel 'at depth'
V heath, shrubland
F October-November
C 5E, 2KC

D. tridentata Meisn.
S sand, sandy gravel
V heath
F August-October
C 20E, 2VC

D. vestita Kipp. ex Meisn.
The main populations of *D. vestita* were in the central wheatbelt, but distinctly outlying populations occurred in the Eneabba-Coorow area.
S lateritic gravel, sandy clay
V heath, mallee heath, 'Tamma scrub'
F December-May
C 18G, 3V (Eneabba pop. 3E, 2C; Wheatbelt pop. 15-, 3VC)

D. sp. A (Voucher A.S. George 14165)
This species had a habit similar to some *D. nivea* forms, but with different shaped leaves and flowers. The leaves were dentate rather than lobed or pinnate as in *D. nivea*. The flowers are more similar to *D. preissii* than they are to *D. nivea*. This species has, since the submission of the manuscript, been described as *D. mimica* by A.S. George (Nuytsia 5: 49-51, 1984).

S sand, sandy loam
V low open woodland, open heath
F December
C 3B, 3E

D. sp. B (Voucher A.S. George 15324)
This species appeared to be intermediate between *D. patens* and *D. polycephala*.
S sandy laterite
V heath, woodland
F July-November
C 11E, 2V

D. sp. C (Voucher E.A. Griffin 971)
This species was closely related to *D. falcata* but geographically separate.
S laterite
V heath, scrub
F August-September
C 13F, 3C

D. sp. D (Voucher A.S. George 9446)
The habit and leaves of this species were similar to but the inflorescence was quite different.
S sandy gravel
V heath, scrub
F July-September
C 3B, 2V

D. sp. E (Voucher G.J. Keighery 4848)
This species was related to *D. armata* but had larger leaves and inflorescences.
S sandy clay over sandstone
V mallee heath
F March-September
C 5E, 2C

D. sp. F (Voucher F. Lullfitz 3379)
This species was known from only one locality in the Stirling Range.
S rocky
V ? mallee heath
F October
C 3B, 2RC

D. sp. G (Voucher K. Newbey 2839)
This species was closely related to *D. carduacea* and *D. squarrosa*, but has longer and narrower leaves and lobes than *D. carduacea*, and has the recurved subulate outer involucral bracts of *D. squarrosa*.
S gravel ridge
V heath
F August-December
C 4E, 2V

D. sp. H (Voucher A.S. George)
This species was closely related to *D. armata* but had different flowers and involucral bracts.
S yellow sand, sand over laterite, lateritic gravel
V heath, scrub, mallee heath
F June-September
C 18G, OC (Southern populations not conserved)

D. sp. I (Voucher E.A. Griffin 2404)
This species was closely related to *D. armata* but had tomentose, not glabrous, limbs and much shorter lobes with distinct sinuses.
S lateritic gravel
V heath, thicket
F August-October
C 14F, 3C

D. sp. J (Voucher J.S. Beard 2121)
This species was closely related to *D. serratuloides* but differed mainly in its leaves.
S sandy gravel
V heath
F September-October
C 7G, 3V

APPENDIX 2

Lists of *Dryandra* species known (or considered likely) to occur in ½° lat. x ½° long. grid cells of south-western Australia. Occurrences not represented by a specimen are indicated by an asterisk. Cells in which no species were considered to occur have not been shown. The key to the cell code numbering is provided in Map 1. Each number consists of a longitudinal component (shown along bottom of map), and a latidudinal component shown along left hand side of map).

GRID CELL 1742 GANTHEAUME — 3 species recorded
D. ashbyi — *D. sessilis* — *D.* sp. H

GRID CELL 1842 AJANA — 3 species recorded
D. ashbyi — *D. sessilis* — *D.* sp. H

GRID CELL 1741 HUTT — 3 species recorded
D. ashbyi — *D. sessilis** — *D.* sp. H*

GRID CELL 1841 NORTHAMPTON — 3 species recorded
D. ashybi — *D. sessilis* — *D.* sp. H

GRID CELL 1941 MUNGO — 2 species recorded
D. ashbyi — *D.* sp. H*

GRID CELL 1840 GERALDTON — 4 species recorded
D. ashbyi — *D. shuttleworthiana* — *D.* sp. H*
D. sessilis

GRID CELL 1940 INDARRA — 6 species recorded
D. ashbyi — *D. nivea* — *D. shuttleworthiana*
D. carlinoides — *D. sessilis* — *D.* sp. H

GRID CELL 2040 MULLEWA — 1 species recorded
*D. ashbyi**

GRID CELL 1839 DONGARA — 2 species recorded
*D. nivea** — *D. sessilis**

GRID CELL 1939 MINGENEW — 7 species recorded
D. ashbyi, *D. bipinnatifida*, *D. carlinoides*, *D. fraseri*, *D. nivea*, *D. sessilis*, *D. shuttleworthiana*

GRID CELL 2039 YANDANOOKA — 6 species recorded
D. ashbyi, *D. carlinoides*, *D. fraseri*, *D. nivea*, *D. shuttleworthiana*, *D.* sp. H

GRID CELL 2239 ROTHSAY — 1 species recorded
D. ashbyi

GRID CELL 1838 BEAGLE ISLANDS — 2 species recorded
*D. nivea**, *D. sessilis**

GRID CELL 1938 ARROWSMITH — 17 species recorded
*D. armata**, *D. bipinnatifida*, *D. carlinoides*, *D. conferta*, *D. fraseri*, *D. kippistiana*, *D. nana*, *D. nivea*, *D. sclerophylla*, *D. sessilis*, *D. shuttleworthiana*, *D. speciosa*, *D. tortifolia*, *D. tridentata*, *D. vestita*, *D.* sp. C, *D.* sp. I

GRID CELL 2038 CARNAMAH — 16 species recorded
D. armata, *D. ashbyi*, *D. bipinnatifida*, *D. carlinoides*, *D. conferta**, *D. fraseri*, *D. kippistiana*, *D. nivea*, *D. patens*, *D. sessilis*, *D. shuttleworthiana*, *D. speciosa**, *D. subulata*, *D.* sp. C, *D.* sp. H, *D.* sp. I

GRID CELL 2138 CARON — 1 species recorded
D. ashbyi

GRID CELL 2738 JOHNSTON RANGE — 1 species recorded
D. arborea

GRID CELL 1837 JURIEN — 2 species recorded
*D. nivea**, *D. sessilis**

GRID CELL 1937 HILL RIVER — 18 species recorded
D. armata, *D. bipinnatifida*, *D. carlinoides*, *D. conferta**, *D. drummondii*, *D. fraseri*, *D. kippistiana*, *D. nana*, *D. nivea*, *D. nobilis*, *D. sclerophylla*, *D. sessilis*, *D. shuttleworthiana*, *D. speciosa*, *D. tortifolia*, *D. tridentata*, *D.* sp. C, *D.* sp. I

GRID CELL 2037 BADGINGARRA — 20 species recorded
D. armata, *D. bipinnatifida*, *D. carlinoides*, *D. conferta*, *D. fraseri*, *D. kippistiana*, *D. nana*, *D. nivea*, *D. patens**, *D. pteridifolia*, *D. sclerophylla*, *D. serratuloides*, *D. sessilis*, *D. shuttleworthiana*, *D. speciosa*, *D. subulata*, *D. tridentata*, *D. vestita*, *D.* sp. C, *D.* sp. I

GRID CELL 2137 WATHEROO — 4 species recorded
D. armata *D. conferta* *D. fraseri*
D. ashbyi

GRID CELL 2737 JACKSON — 1 species recorded
D. arborea

GRID CELL 2837 BUNGALBIN — 1 species recorded
D. arborea

GRID CELL 1936 WEDGE ISLAND — 10 species recorded
*D. bipinnatifida** *D. nivea* *D. shuttleworthiana*
*D. carlinoides** *D. sclerophylla** *D. tortifolia*
D. conferta *D. sessilis** *D.* sp. C*
*D. nana**

GRID CELL 2036 DANDARAGAN — 17 species recorded
D. armata *D. kippistiana* *D. serratuloides**
*D. bipinnatifida** *D. nana* *D. sessilis*
D. carlinoides *D. nivea* *D. shuttleworthiana*
*D. conferta** *D. patens* *D.* sp. B
D. cuneata *D. pteridifolia* *D.* sp. C*
D. fraseri *D. sclerophylla*

GRID CELL 2136 MOORA — 14 species recorded
D. armata *D. fraseri* *D. polycephala*
D. bipinnatifida *D. kippistiana* *D. serratuloides*
D. carduacea *D. nivea* *D. sessilis*
D. carlinoides *D. nobilis* *D.* sp. B
*D. conferta** *D. patens*

GRID CELL 2236 WONGAN — 6 species recorded
D. armata *D. fraseri* *D. patens*
D. comosa *D. nivea** *D. pulchella*

GRID CELL 2336 KOORDA — 5 species recorded
D. armata *D. fraseri* *D. sessilis*
D. conferta *D. pteridifolia*

GRID CELL 2736 BULLFINCH — 1 species recorded
*D. arborea**

GRID CELL 2836 — 1 species recorded
D. arborea

GRID CELL 1935 LEDGE POINT — 2 species recorded
*D. nivea** *D. sessilis*

GRID CELL 2035 GINGIN — 14 species recorded
*D. armata** *D. kippistiana* *D. serratuloides*
D. bipinnatifida *D. nivea* *D. sessilis*
D. carduacea *D. nobilis* *D. shuttleworthiana*
*D. carlinoides** *D. patens* *D.* sp. B
D. fraseri *D. polycephala*

GRID CELL 2235 GOOMALLING — 6 species recorded
D. armata *D. fraseri* *D. patens**
D. carduacea *D. nivea* *D. sessilis**

GRID CELL 2335 DOWERIN — 3 species recorded
D. armata *D. fraseri** *D. horrida*

GRID CELL 2435 TRAYNING — 2 species recorded
*D. armata** *D. horrida**

GRID CELL 2535 MERREDIN — 1 species recorded
*D. horrida**

GRID CELL 2635 WESTONIA — 3 species recorded
D. conferta *D. horrida* *D. sessilis*

GRID CELL 2034 PERTH — 4 species recorded
A. armata *D. sessilis* *D.* sp. A
D. nivea

GRID CELL 2134 WOOROLOO — 12 species recorded
D. armata *D. fraseri* *D. polycephala*
D. bipinnatifida *D. nivea* *D. praemorsa**
D. carduacea *D. nobilis* *D. proteoides*
D. drummondii *D. patens** *D. sessilis*

GRID CELL 2234 NORTHAM — 11 species recorded
D. armata *D. nivea* *D. proteoides*
*D. carduacea** *D. nobilis** *D. sessilis*
*D. drummondii** *D. patens* *D. stuposa*
D. fraseri *D. praemorsa*

GRID CELL 2334 CUNDERDIN — 5 species recorded
D. armata *D. horrida* *D. vestita*
*D. fraseri** *D. speciosa*

GRID CELL 2434 KELLERBERRIN — 5 species recorded
D. armata *D. horrida* *D. vestita*
D. fraseri *D. speciosa**

GRID CELL 2534 BRUCE ROCK — 4 species recorded
D. armata *D. pteridifolia* *D. speciosa**
*D. horrida**

GRID CELL 2634 MUNTAGIN — 3 species recorded
D. armata *D. conferta* *D. horrida*

GRID CELL 2734 HOLLETON — 3 species recorded
D. armata *D. conferta** *D. pteridifolia*

GRID CELL 2033 FREMANTLE — 2 species recorded
D. nivea *D. sessilis*

GRID CELL 2133 JARRAHDALE — 9 species recorded
D. armata *D. carduacea* *D. praemorsa*
*D. bipinnatifida** *D. nivea* *D. sclerophylla*
D. calophylla *D. nobilis* *D. sessilis*

GRID CELL 2233 BEVERLEY — 13 species recorded

D. armata
D. carduacea
D. conferta
D. cynaroides
D. drummondii
*D. fraseri**
D. nivea
D. nobilis
*D. praemorsa**
*D. proteoides**
D. sessilis
D. stuposa
D. vestita

GRID CELL 2333 BROOKTON — 11 species recorded

D. armata
*D. carduacea**
*D. conferta**
*D. ferruginea**
*D. fraseri**
D. nivea
*D. nobilis**
*D. proteoides**
D. sessilis
D. vestita

GRID CELL 2433 CORRIGIN — 7 species recorded

*D. armata**
*D. cirsioides**
D. conferta
D. ferruginea
D. horrida
D. nivea
D. vestita

GRID CELL 2533 NAREMBEEN — 5 species recorded

D. armata
*D. cirsioides**
*D. ferruginea**
D. horrida
D. speciosa

GRID CELL 2633 HYDEN — 3 species recorded

*D. armata**
D. cirsioides
*D. conferta**

GRID CELL 2733 O'CONNOR — 4 species recorded

*D. armata**
D. cirsioides
D. conferta
*D. erythrocephala**

GRID CELL 2833 HOLLAND — 5 species recorded

D. armata
*D. cirsioides**
D. conferta
*D. erythrocephala**
D. sp. D*

GRID CELL 2032 PINJARRA — 2 species recorded

*D. nivea**
*D. sessilis**

GRID CELL 2132 DWELLINGUP — 6 species recorded

*D. bipinnatifida**
D. carduacea
D. nivea
D. praemorsa
*D. sessilis**
D. subpinnatifida

GRID CELL 2232 CROSSMAN — 11 species recorded

D. armata
D. bipinnatifida
D. carduacea
*D. fraseri**
D. nivea
D. nobilis
D. praemorsa
D. proteoides
D. sessilis
*D. stuposa**
D. subpinnatifida

GRID CELL 2332 NARROGIN — 15 species recorded

D. arctotidis
D. armata
D. carduacea
D. conferta
D. cynaroides
D. drummondii
D. ferruginea
D. fraseri
D. nivea
D. nobilis
D. proteoides
D. sessilis
D. stuposa
D. subpinnatifida
D. vestita

GRID CELL 2432 YEALERING — 14 species recorded

*D. armata**
*D. carduacea**
D. cirsioides
D. conferta
D. cuneata
D. cynaroides
D. drummondii
D. ferruginea
D. fraseri
*D. horrida**
D. nivea
D. pteridifolia
D. vestita
D. sp. J

GRID CELL 2532 KULIN — 10 species recorded

D. cirsioides — *D. erythrocephala* — *D. nivea**
D. conferta — *D. ferruginea* — *D. sessilis*
*D. cuneata** — *D. horrida* — *D. vestita**
D. drummondii

GRID CELL 2632 PEDERAH — 3 species recorded

D. cirsioides — *D. erythrocephala* — *D. ferruginea*

GRID CELL 2732 HURLESTONE — 3 species recorded

D. cirsioides — *D. erythrocephala** — *D. ferruginea**

GRID CELL 2832 IRONCAP — 4 species recorded

D. cirsioides — *D. ferruginea** — *D.* sp. D
*D. erythrocephala**

GRID CELL 2932 HOPE — 3 species recorded

D. cirsioides — *D. erythrocephala* — *D. ferruginea*

GRID CELL 3032 TAY — 2 species recorded

*D. cirsioides** — *D. erythrocephala*

GRID CELL 2031 BUNBURY — 4 species recorded

*D. bipinnatifida** — *D. nivea** — *D. sessilis*
*D. carduacea**

GRID CELL 2131 COLLIE — 4 species recorded

D. bipinnatifida — *D. nivea** — *D. sessilis*
D. carduacea

GRID CELL 2231 DARKAN — 7 species recorded

*D. bipinnatifida** — *D. nivea** — *D. stuposa**
D. carduacea — *D. sessilis* — *D. subpinnatifida**
D. fraseri

GRID CELL 2331 WAGIN — 14 species recorded

D. armata — *D. drummondii* — *D. sessilis**
D. calophylla — *D. ferruginea* — *D. stuposa**
D. carduacea — *D. fraseri* — *D. subpinnatifida**
D. cirsioides — *D. nivea* — *D. tenuifolia*
*D. cynaroides** — *D. nobilis*

GRID CELL 2431 DUMBLEYUNG — 15 species recorded

*D. armata** — *D. cynaroides* — *D. nivea*
D. carduacea — *D. drummondii** — *D. nobilis**
*D. cirsioides** — *D. erythrocephala** — *D. preissii*
*D. conferta** — *D. ferruginea* — *D. pteridifolia**
D. cuneata — *D. fraseri* — *D.* sp. J

GRID CELL 2531 KUKERIN — 13 species recorded

D. carduacea — *D. erythrocephala* — *D. nivea*
D. cirsioides — *D. ferruginea* — *D. pteridifolia*
D. conferta — *D. foliosissima* — *D. vestita*
D. cuneata — *D. horrida* — *D.* sp. J
D. drummondii

GRID CELL 2631 BURNGUP — 7 species recorded
D. cirsioides — *D. erythrocephala* — *D. foliosissima**
*D. cuneata** — *D. ferruginea* — *D. pteridofolia*
*D. drummondii**

GRID CELL 2731 NEWDEGATE — 6 species recorded
*D. cirsioides** — *D. erythrocephala** — *D. foliosissima**
D. drummondii — *D. ferruginea** — *D. pteridifolia**

GRID CELL 2831 KING — 5 species recorded
D. cirsioides — *D. ferruginea* — *D. pteridifolia*
D. erythrocephala — *D. foliosissima**

GRID CELL 2931 MOOLYALL — 4 species recorded
D. cirsioides — *D. ferruginea* — *D. foliosissima**
D. erythrocephala

GRID CELL 3231 SCADDAN — 3 species recorded
*D. armata** — *D. cuneata* — *D. obtusa*

GRID CELL 3331 BURDETT — 1 species recorded
D. armata

GRID CELL 3431 BEAUMONT — 2 species recorded
*D. armata** — *D. cuneata*

GRID CELL 3531 BURAMINYA — 3 species recorded
D. armata — *D. cuneata* — *D. longifolia*

GRID CELL 1830 CLAIRAULT — 2 species recorded
D. nivea — *D. sessilis*

GRID CELL 1930 BUSSELTON — 6 species recorded
D. baxteri — *D. carduacea* — *D. sessilis*
D. bipinnatifida — *D. nivea* — *D.* sp. A

GRID CELL 2030 DONNYBROOK — 5 species recorded
D. baxteri — *D. carduacea* — *D. sessilis**
*D. bipinnatifida** — *D. nivea*

GRID CELL 2230 DINNINUP — 7 species recorded
*D. bipinnatifida** — *D. nivea* — *D. stuposa*
*D. carduacea** — *D. sessilis* — *D. subpinnatifida*
D. fraseri

GRID CELL 2330 KOJONUP — 17 species recorded
D. armata — *D. cynaroides* — *D. sessilis**
D. bipinnatifida — *D. drummondii* — *D. stuposa*
D. calophylla — *D. fraseri* — *D. subpinnatifida*
D. carduacea — *D. nivea* — *D. tenuifolia*
D. conferta — *D. nobilis** — *D.* sp. G
D. cuneata — *D. pteridifolia*

GRID CELL 2430 KATANNING — 18 species recorded

D. armata
*D. calophylla**
*D. carduacea**
D. conferta
D. cuneata
*D. drummondii**
*D. fraseri**
D. mucronulata
D. nivea
D. nobilis
D. plumosa
*D. preissii**
*D. pteridifolia**
*D. sessilis**
D. stuposa
*D. subpinnatifida**
*D. tenuifolia**
D. sp. G

GRID CELL 2530 NYABING — 16 species recorded

*D. arctotidis**
D. armata
D. calophylla
D. cirsioides
D. conferta
*D. cuneata**
D. drummondii
D. erythrocephala
D. ferruginea
D. foliosissima
D. fraseri
D. nivea
*D. pteridifolia**
*D. sessilis**
D. tenuifolia
D. sp. J

GRID CELL 2630 JERRAMUNGUP — 9 species recorded

*D. arctotidis**
D. cirsioides
*D. conferta**
D. cuneata
*D. ferruginea**
*D. foliosissima**
*D. nivea**
*D. pteridifolia**
D. tenuifolia

GRID CELL 2730 JACUP — 12 species recorded

*D. arctotidis**
D. cirsioides
D. cuneata
*D. falcata**
*D. ferruginea**
*D. foliosissima**
*D. nivea**
*D. obtusa**
D. pteridifolia
D. quercifolia
*D. sessilis**
*D. tenuifolia**

GRID CELL 2830 COCANARUP — 12 species recorded

*D. arctotidis**
*D. cirsioides**
D. cuneata
D. erythrocephala
D. falcata
*D. foliosissima**
D. nivea
D. obtusa
*D. pteridifolia**
D. quercifolia
D. tenuifolia
D. sp. J

GRID CELL 2930 RAVENSTHORPE — 10 species recorded

D. arctotidis
D. cirsioides
D. cuneata
D. falcata
D. ferruginea
D. foliosissima
D. obtusa
D. pteridifolia
D. quercifolia
D. tenuifolia

GRID CELL 3030 OLDFIELD — 5 species recorded

D. armata
*D. cirsioides**
*D. cuneata**
D. obtusa
D. pteridifolia

GRID CELL 3130 STOKES INLET — 2 species recorded

*D. armata**
*D. obtusa**

GRID CELL 3230 ESPERANCE — 5 species recorded

*D. armata**
D. cuneata
D. longifolia
D. nivea
D. obtusa

GRID CELL 3330 MERIVALE — 9 species recorded

D. armata
D. cirsioides
D. cuneata
D. falcata
D. longifolia
D. nivea
D. obtusa
D. pteridifolia
D. tenuifolia

GRID CELL 3430 HOWICK — 6 species recorded

D. armata
D. cuneata
*D. longifolia**
D. nivea
D. obtusa
D. tenuifolia

GRID CELL 3530 SANDY BIGHT — 7 species recorded

D. armata
D. cuneata
D. longifolia
D. nivea
D. obtusa
D. pteridifolia
D. tenuifolia

GRID CELL 3630 MALCOLM — 4 species recorded

D. cuneata
D. longifolia
D. obtusa
D. tenuifolia

GRID CELL 1829 TOOKER — 2 species recorded

*D. nivea**
*D. sessilis**

GRID CELL 1929 LEEUWIN — 3 species recorded

D. formosa
*D. nivea**
D. sessilis

GRID CELL 2029 DONNELLY — 3 species recorded

D. bipinnatifida
D. nivea
*D. sessilis**

GRID CELL 2129 MANJIMUP — 3 species recorded

D. bipinnatifida
*D. nivea**
*D. sessilis**

GRID CELL 2229 TONEBRIDGE — 3 species recorded

*D. bipinnatifida**
*D. nivea**
*D. sessilis**

GRID CELL 2329 FRANKLAND — 9 species recorded

D. armata
*D. calophylla**
*D. drummondii**
*D. fraseri**
D. nivea
D. preissii
D. pteridifolia
D. sessilis
*D. tenuifolia**

GRID CELL 2429 TAMBELLUP — 19 species recorded

D. arctotidis
D. armata
D. calophylla
D. concinna
D. cuneata
D. drummondii
D. falcata
D. foliolata
D. formosa
D. fraseri
D. mucronulata
D. nivea
D. plumosa
D. preissii
D. pteridifolia
D. senecilifolia
D. sessilis
D. tenuifolia
D. sp. E

GRID CELL 2529 BORDEN — 22 species recorded

D. arctotidis
D. armata
D. baxteri
D. calophylla
*D. cirsioides**
D. concinna
*D. conferta**
D. cuneata
D. drummondii
D. falcata
D. foliolata
D. foliosissima
D. formosa
D. mucronulata
D. nivea
D. nobilis
D. plumosa
D. pteridifolia
D. sessilis
D. tenuifolia
D. sp. E
D. sp. F

GRID CELL 2629 PALLINUP — 14 species recorded

D. arctotidis
D. armata
D. calophylla
*D. cirsioides**
D. conferta
D. cuneata
*D. drummondii**
D. falcata
*D. nivea**
*D. obtusa**
D. plumosa
D. pteridifolia
*D. sessilis**
D. tenuifolia

GRID CELL 2729 BREMER — 12 species recorded
D. arctotidis, *D. armata**, *D. cirsioides*, *D. cuneata*, *D. falcata*, *D. nivea*, *D. obtusa*, *D. plumosa*, *D. pteridifolia*, *D. quercifolia*, *D. sessilis*, *D. tenuifolia*

GRID CELL 2829 HOOD POINT — 9 species recorded
*D. arctotidis**, *D. cirsioides*, *D. cuneata**, *D. falcata*, *D. nivea**, *D. obtusa*, *D. pteridifolia**, *D. quercifolia*, *D. tenuifolia*

GRID CELL 3329 MONDRAIN — 1 species recorded
D. longifolia

GRID CELL 3529 CAPE ARID — 1 species recorded
D. longifolia

GRID CELL 2128 NORTHCLIFFE — 1 species recorded
*D. formosa**

GRID CELL 2228 DEEP RIVER — 4 species recorded
D. formosa, *D. nivea*, *D. serra*, *D. tenuifolia**

5 species recorded

GRID CELL 2328 DENMARK — 5 species recorded
D. formosa, *D. nivea**, *D. serra**, *D. sessilis**, *D. tenuifolia**

GRID CELL 2428 MOUNT BARKER — 15 species recorded
D. arctotidis, *D. armata*, *D. baxteri*, *D. calophylla*, *D. conferta*, *D. drummondii**, *D. formosa*, *D. tenuifolia*, *D. nivea*, *D. preissii*, *D. pteridifolia*, *D. seneciifolia*, *D. serra*, *D. sessilis*, *D. squarrosa*

GRID CELL 2528 MANYPEAKS — 13 species recorded
D. arctotidis, *D. armata*, *D. baxteri**, *D. calophylla*, *D. conferta**, *D. drummondii*, *D. formosa*, *D. mucronulata*, *D. nivea*, *D. pteridifolia*, *D. serra*, *D. sessilis*, *D. tenuifolia*

GRID CELL 2628 CHEYNE — 12 species recorded
D. arctotidis, *D. armata**, *D. baxteri**, *D. calophylla**, *D. cuneata**, *D. falcata**, *D. mucronulata*, *D. nivea*, *D. plumosa*, *D. pteridifolia*, *D. sessilis**, *D. tenuifolia*

GRID CELL 2227 NORNALUP — 4 species recorded
D. formosa, *D. nivea*, *D. serra*, *D. tenuifolia*

GRID CELL 2327 PARRY INLET — 4 species recorded
*D. formosa**, *D. nivea**, *D. serra**, *D. tenuifolia**

GRID CELL 2427 ALBANY — 6 species recorded

D. baxteri	*D. nivea**	*D. sessilis*
D. formosa	*D. serra*	*D. tenuifolia*

GRID CELL 2527 BREAKSEA — 2 species recorded

D. baxteri	*D. formosa*

WESTERN AUSTRALIAN HERBARIUM RESEARCH NOTES

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REGISTER OF LICHEN TYPE SPECIMENS AND CHEMISTRY OF LICHEN TYPE SPECIMENS IN THE BRITISH MUSEUM AND GENEVA

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ABSTRACT

A total of 188 Australian type taxa have been located in the British Museum of Natural History and the Conservatoire et Jardin Botaniques, Geneva. These are listed alphabetically together with locality data and status.

The chemical constituents of 73 type specimens are also given. The taxa are arranged in alphabetical order and the status of each given.

INTRODUCTION

Australian students of lichen taxonomy must invariably revert to examining type specimens for critical studies. In the past, access to Australian type specimens had been difficult because of the lack of the relevant early literature or ignorance of the location of these types.

This paper lists alphabetically the names of all Australia type specimens located at the British Museum of Natural History and the Conservatoire et Jardin Botaniques, Geneva. Most of these types have now been photographed, as well as relevant authenticated types in the Linnean Herbarium. The type locality and other herbarium label data are also listed, and the status of each type specimen is designated, where possible.

This list is not complete as many type specimens were out on loan at the time the list was being compiled.

Many type specimens housed in the British Museum of Natural History and the Conservatoire et Jardin Botaniques, Geneva have the chemical constituents of the specimen listed on the herbarium sheets. As chemical taxonomy has great emphasis in lichen taxonomy, where morphological characters are relatively few, a list of the types and their determined chemistry, as detailed on the sheets, are catalogued.

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AUSTRALIAN LICHEN TYPE SPECIMENS HOUSED IN THE BRITISH MUSEUM (NATURAL HISTORY) LONDON
(N.D. = not designated)

Taxon	Locality	Status
Anzia semiteres	Tasmania, F.v.Mueller	N.D.
Anzia wilsonii	Eastern Creek, N.S.W., F.R.M.Wilson	N.D.
Arthonia albofarinosa	W. Warwick, Queensland, F.M.Bailey 30	N.D.
Chondropsis semiviridis	Table Mountain, Tasmania	N.D.
Cladonia xanthoclada	Mt. Lindsay, Australia, Webb (ex Herb. J.Mueller)	N.D.
Collema atrum	Warrnambool, Victoria	Isolectotype
Collema congestum	Victoria, Australia, F.R.M.Wilson	Isolectotype
Collema gwytheri	Neighbourhood of Warwick, Queensland, C.J.Gwyther	Isotype
Collema laeve var. *senecornis*	Mt. Macedon, et Lakes Entrance, Gippsland, Victoria, F.R.M.Wilson 1886	Isotype
Collema robillardii	Mt. Macedon	Isotype
Diploschistes subocellatus	Risdon Cove, Tasmania, R.Medwin	N.D.
Haematomma puniceum var. *collatum*	Jimbour, Queensland, F.M.Bailey, 1895	N.D.
Haematomma puniceum var. *infuscum*	Jimbour, Queensland, F.M.Bailey	N.D.
Lecidea antiptiza	Tasmania, H.Paton, 1875	N.D.
Lecidea consanguinea	Australia, H.Paton	N.D.
Lobaria crenulata	Brisbane, Queensland, F.M.Bailey	N.D.
Menegazzia retipora	Tasmania, Mrs. Heywood McEwen, May 1892	N.D.
Neophyllis melacarpa	Victoria, Australia, F.R.M.Wilson	Isotype
Pannaria terrestris	near Warwick, Queensland, F.M.Bailey 17.i.1899	N.D.
Pannaria sorediata	Pimpana, Queensland, F.M.Bailey	N.D.
Parmelia amplexula	near Brisbane, Queensland, F.M.Bailey, Oct. 1878	Holotype
Parmelia australiensis	Scyphophorus lat Mont Tabul in Diem, R.Brown 525, Iter Australiense, 1802-5	Lectotype
Parmelia brisbanensis	Brisbane, Queensland, F.M.Bailey, Oct. 1878	N.D.
Parmelia ciliifera	Brisbane, Queensland, F.M.Bailey, 53	Holotype

Taxon	Locality	Status
Parmelia dichotoma	Braidwood District, Bauerlen	N.D.
Parmelia endoleuca	Swan River, James Drummond 75	N.D.
Parmelia erubescens	prope Brisbane, Queensland, F.M.Bailey	Holotype
Parmelia laceratula	Burnett and Brisbane Rivers, F.v.Mueller	N.D.
Parmelia obversa	Riverina, N.S.W., Hugh Patton	Holotype
Parmelia permutata	Brisbane River, Queensland, F.M.Bailey	Holotype
Parmelia platycarpa	near Brisbane, F.M.Bailey	Holotype
Parmelia redacta	Illawarra, N.S.W., Kirton	Holotype
Parmelia reparata	Gocorie Mount., Brisbane, F.M.Bailey	Holotype
Parmelia rutidota	Mt. Gambier	N.D.
Parmelia subdistorta	6 miles W. of Red Cliffs along the Werrimull road, on soil, S.Kurokawa 8.xii.1965	Isotype
Parmelia tasmanica	Swan River, James Drummond 1843 Castlereagh River, Sydney C.Moore 5/76 New Holland, Mr. Schleicher	N.D. N.D. N.D.
Parmelia tenuirima	Van Dieman's Land, Gunn	N.D.
Physcia caesia	Swan River, James Drummond	N.D.
Ocellularia eucalypti	Kilmore, Victoria, F.R.M.Wilson, 13.v.1896	N.D.
Siphula coriacea	Swan River, James Drummond, 1843	N.D.
Siphula erosa	Lake Hartz, Tasmania, on mossy bole of tree overhanging lake, P.W.James, 29.iii.1963	N.D.
Thysanothecium hyalinum	Swan River, James Drummond 70, on sandy clay	Isolectotype
Thysanothecium hookeri	Swan River, James Drummond 69, ad ligna necnon ad terram nudam	Lectotype
Usnea baileyi	Queensland, F.M.Bailey 164, 1881	N.D.
Usnea molliuscula	Victoria, subalpine country in the upper Ovans River, Mrs. McCann, July 1882	N.D.
Usnea propinqua	Rockhampton, N.S.W.	N.D.
Usnea scarbida	Swan River, James Drummond, 1843	N.D.
Usnea formosa	Peak Range, Australia, F.v.Mueller	N.D.
Usnea himnathodes	Illawarra, N.S.W., Kirton	N.D.
Usnea tasmanica	Tasmania, Astrolabe 31	N.D.
Lichina tasmanica	Cradle Mountains, on rocks in stream, Tasmania, Rodway, Dec. 1915	Paratype

LICHEN TYPE SPECIMENS HOUSED IN THE CONSERVATOIRE ET JARDIN BOTANIQUES, GENEVA
(N.D. = not designated)

Taxon	Locality	Status
Acarospora wilsonii	On sandstone, Kew, Victoria, F.R.M.Wilson 1892	Cotype
Anzia wilsonii	Eastern Creek, N.S.W. F.R.M.Wilson 1892	Isotype
Buellia amblyogona	Thursday Island, Queensland, Knight 1887	N.D.
Buellia arenaria	Lorne, Victoria, F.R.M.Wilson 1044, 1893	N.D.
Buellia australica	Kuranda, Cairns, North Queensland F.R.M.Wilson 1893	N.D.
Buellia demutans	Queensland, Knight 1887	N.D.
Buellia desertorum	Victoria Desert, W.A., R.Helms 51, 1891	N.D.
Buellia endoleuca	Camperdown, Victoria, F.R.M.Wilson 692, 1892	N.D.
Buellia exilis	Rockhampton, Thozet	N.D.
Buellia extenuata f. *athallina*	Warrnambool, Victoria, Wilson 669 (p.p.) 1890	Syntype
	Kew, Victoria, F.R.M.Wilson 705, 1892	Syntype
Buellia farinulenta	Warrnambool, Victoria, F.R.M.Wilson 1417, 1892	N.D.
Buellia fuliginosa	Mt. Macedon, Victoria, F.R.M.Wilson 1691 (p.p.) 1891	N.D.
Buellia geographica	Kuranda, Cairns, North Queensland, F.R.M.Wilson vii.1893	N.D.
Buellia glomerulans	Wallangering, W.A., R.Helms 55	N.D.
Buellia halophila	Cheltenham, Victoria, Wilson 734, 1890, on maritime rocks	N.D.
Buellia inturgescens	Camp 14, Western Australia, R.Helms 81, 1891	N.D.
Buellia macrospora	Youyangs, Victoria, F.R.M.Wilson 827, 1892, on granite	N.D.
Buellia macrosporoides	Thursday Island, Hartmann comm. by Knight 1887 "ad terram coctam ut videtur"	N.D.
Buellia marginulata	Everard Ranges, South Australia, R.Helms 96	N.D.
Buellia perexigua	Erskine River, Victoria, F.R.M.Wilson 1038, 1892	N.D.
Buellia pruinosa	Warrnambool, Victoria, F.R.M.Wilson 724, 1892, on limestone	N.D.

Taxon	Locality	Status
Buellia subarenaria	Lorne, Victoria, F.R.M.Wilson 1031, 1892	Syntype
	Little River, Victoria, F.R.M.Wilson 1438, 1892	Syntype
	Kew, Victoria, F.R.M.Wilson 1386, 1892	Syntype
Buellia subcoronata	Wallangering, W.A., R.Helms, 21.xi. 1891, on soil	Syntype
	Depot No. 1, R.Helms, 9.vi.1891, on soil	Syntype
Buellia submaritima	Warrnambool, Victoria, F.R.M.Wilson 732, 1892, on limestone	N.D.
Buellia ventricosa	Mt. Macedon, Moffat, communicated by F.v.Mueller 1882, on bark	N.D.
Buellia wilsoniana	Warrnambool, Victoria, F.R.M.Wilson 725, 1892, on limestone	N.D.
Cladia ferdinandii	Esperance Bay, communicated by F.v.Mueller 1881	N.D.
Cladonia degerans var. *pleuroclada*	Grampians, Australia, Sullivan	Syntype
	Parramatta, Nova Hollandia, F.v.Mueller 1881	Syntype
Cladonia furcata var. *asperata*	Illawarra, N.S.W., Kirton	Syntype
	Twofold Bay, Tyrone White	Syntype
	Mt. Wellington, Nova Hollandiae, Sieber	Syntype
	Scaler's Cove, Australia felix (ex herb. Hampe, 1877)	Syntype
Cladonia furcata var. *virgulata*	near Mt. Dromedary, N.S.W., Reader 1879	Holotype
Cladonia furcata var. *subsquamosa*	Illawarra, N.S.W., Kirton	Holotype
Cladonia leucocephala	New England, Australia, Dr. Mueller Herbarium Kew 1889	N.D.
Cladonia scutellata	ad caudicem Macrozamia preissii, Swan River, Preiss	N.D.
Clathroporina desquamans	Brisbane, in cortice Araucaria cunninghamii, Bailey 449, 1889	Holotype
Clathroporina flavescens	Brisbane, Australia, Bailey 515, 1889	N.D.
Clathroporina olivacea	Toowoomba, Queensland, Hartmann	N.D.
Clathroporina robusta	Trinity Bay, Queensland, Sayer	Holotype
Coccocarpia pellita var. *mesomorpha*	Bellenden Ker district, Bailey 551, 1889	Syntype
	New Hebrides, Rev. Wilson 1893	Syntype
Coenogonium rigidulum	Toowoomba, Queensland, Hartmann	Syntype
	Clarence River, Wilcox	Syntype

Taxon	Locality	Status
Diplogramma australiense	Brisbane, Bailey 510, 1889	Holotype
Diploschistes scruposus var. *australica*	Victoria, ad terram arenosum, F.R.M.Wilson, 1888	N.D.
Dirinastrum australiense	Warrnambool, Victoria, F.R.M.Wilson 735, 1890, on maritime calcareous rocks	Holotype
Endocarpon helmsianum	Camp 21(?), R.Helms, 14.vii.1891	N.D.
Endocarpon victoriae	Cheltenham, Victoria, Wilson 988, 1891	Holotype
Gyalecta leptospora	Beaconsfield, Victoria, Wilson, 1892	N.D.
Glyphis cicatricosa var. *depauperata*	Bellenden Ker, Queensland, Bailey 548, 1889	N.D.
Gymnographa medusulina	Rockhampton, Queensland, Thozet	Holotype
Heppia acarosporoides	Western Australia, Camps 1 & 2, Helms, 7.vi.1891	Holotype
Heppia australiensis	Western Australia, R.Helms 35, 28.v.1891	Holotype
Heppia brisbanensis	Queensland, Shirley 51, 1891	N.D.
Lecania subsquamosa var. *leprosa*	Kew, Victoria, on sandstone, F.R.M.Wilson 1741	N.D.
Lecania molliuscula	Victoria, F.R.M.Wilson 1372, 1893	Holotype
Lecania chlaronoides	N.S.W., Dr. Knight 43 (p.p.), 1887	N.D.
Lecanactis microporella	Queensland, Shirley, 1893	N.D.
Lecanactis platygraphoides	Brisbane, Queensland, Bailey 1541, 1891	N.D.
Lecanactis quassiae var. *obfuscata*	Toowoomba, Queensland, Hartmann 35	N.D.
Leptogium pecten	Glenmaggie, Victoria, F.R.M.Wilson, on butt of ti tree, Sept. 1886	Syntype
Leptotrema aemulum	Queensland, Knight 295, 1887	Lectotype
Leptotrema diffractum	Bellenden Ker district, Bailey 527, 1889	Holotype
Leptotrema fallax	Richmond River, Australia, Miss Hodgkinson	Holotype
Leptotrema heterosporum	Australia, Dr. Knight 1886	Isotype
Leptotrema integrum	Russell River, Queensland, Sayer 20	Holotype
Leptotrema nitidulum	Queensland, Knight 22, 1887	Holotype
Leptotrema polycarpum	Queensland, Knight 80, 1887	Isotype
Medusulina egenella	Belleden Ker, Queensland, Bailey, 1889	N.D.
Parathelium decumbens	Brisbane, Queensland, Bailey 1611, 1891	N.D.

Taxon	Locality	Status
Parmelia amphixantha	N.W. of Lake Albacutya, Victoria, C.French, communicated by F.v.Mueller 1887	Holotype
Parmelia coniocarpa	Nova Hollandiae, M.Sieber, 1826	Isotype
Parmelia convoluta	Central Australien, Giles	N.D.
Parmelia conspersa var. *constrictans* f. *isidiophora*	Mt. Macedon, Victoria, Moffat	Holotype
Parmelia conspersa var. *laxa*	Mt. Kosciusko, N.S.W., Findlay	Syntype
Parmelia conspersa var. *laxa* f. *isidiigera*	King George's Sound, Harris communicated by F.v.Mueller 1881	Holotype
Parmelia conspersa var. *strigosa*	Beechworth, Australia, Victoria, Falck 12, 1881	Holotype
Parmelia conspersa var. *stenophylla* f. *isidiosa*	Western Australia, Helms, on piece of rock	Lectotype
Parmelia conspersa var. *stenophylloides*	Western Australia, Depot no. 1, R.Helms, 16.vi.1891	Syntype
Parmelia ferax	Guntawang, N.S.W., Hamilton	Holotype
Parmelia furcata	N.S.W., Leichhardt, communicated by F.v.Mueller 1882	Holotype
Parmelia ochroleuca	Illawarra, N.S.W., Kirton	Holotype
Parmelia ochroleuca var. *sorediosa*	near Mt. Dromedary, N.S.W., Reader, 1882	Syntype
	Twofold Bay, N.S.W., Tyrone White, 1882	Syntype
Parmelia gracilis	Daintree River, Queensland, Pentyke 1887	Holotype
Parmelia hospitans	Parramatta, Woolls, communicated by F.v.Mueller 1879	Syntype
Parmelia hypoleuca	Victoria, Frencla scrubs, French 1887	Holotype
Parmelia hypoleuca f. *coralloidea*	Lower Murray River, Victoria, French, 1887	Holotype
Parmelia limbata f. *endococcinea*	Russell River, Queensland, Sayer, 1886	Holotype
Parmelia physodes var. *leucina*	Dargo, subalpine plains, R.Holl., communicated by F.v.Mueller 1895	N.D.
Parmelia physodes var. *rugosa*	Mt. Macedon, Victoria, Moffat 45	Syntype
	Grampians, Victoria, D.Sullivan 15	Syntype
Parmelia physodes var. *tenuis*	Parramatta, Woolls	Syntype
	McLeay River, Australia, Aug. Budder	Syntype
Parmelia polycarpa	Swan River, James Drummond 73	N.D.

Taxon	Locality	Status
Parmelia proboscidea var. *aspera*	Ash Island, Hunter River, N.S.W., E.Forde, 1881	Syntype
Parmelia pruinata	Yorke Peninsula, South Australia, on *Cryptandra amara*, Tepper, 1879	Holotype
Parmelia subdistorta	6 miles west of Red Cliffs along the Werrimull road, Victoria, on soil, S.Kurokawa, 8.xii.1965	Isotype
Parmelia tenuirima f. *coralloidea*	Mitchell River, Gippsland, C.B(r)oss, 1882	Lectotype
Parmelia tenuirima f. *isidiosa*	Victoria, Knight, 1887	Holotype
Parmelia tiliacea var. *convexula*	Brisbane, Bailey, 1891	Holotype
Parmelia tiliacea var. *feracissima*	Guntawang, N.S.W., Hamilton, 1885	Holotype
Parmelia tiliacea var. *rugulata*	Queensland, F.M.Bailey Toowoomba, Queensland, Hartmann	Syntype Syntype
Parmelia tiliacea var. *stenophylla*	Toowoomba, Queensland, Hartmann	Holotype
Parmelia urceolata var. *subcetraria*	Toowoomba, Queensland, Hartmann, 1881	Holotype
Parmelia versicolor	Eurio, A.Richards, June 1880	Holotype
Parmelia virens var. *sorediata*	Toowoomba, Queensland, Hartmann, 1882	Holotype
Parmelia xanthomelana	Grampians, Australia, Sullivan, 1882	Holotype
Parmeliella bauerleni	Broger's Creek, W.Bauerlen, 1884	Holotype
Parmentaria baileyana	Belleden Ker, Queensland, Bailey 543 (p.p.) 1889	N.D.
Parmentaria microspora	Toowoomba, Dr. Knight 120, 1886	N.D.
Parmentaria subplana	Toowoomba, Queensland, Dr. Knight 222, 1886	N.D.
Parmentaria subumbilicata	Toowoomba, Queensland, Knight	N.D.
Parmentaria subastroidea	Queensland, Shirley 1863, 1893	N.D.
Parmentaria subastroidea var. *subsimplex*	Queensland, Shirley 1875, 1893	N.D.
Phaeographina banksii	Maffra, Victoria, F.R.M.Wilson 879 1892, on *Hymenanthera banksii*	N.D.
Phaeographina caesiopruinosa var. *monospora*	Toowoomba, Queensland, Hartmann, communicated by F.v.Mueller 1894	N.D.
Phyllopsora foliata var. *subcorallina*	Toowoomba, Queensland, Hartmann, communicated by F.v.Mueller 1881	Holotype

Taxon	Locality	Status
Phyllopsora melanocarpa	Victoria, F.R.M.Wilson 150, communicated by F.v.Mueller	N.D.
Physcia crispa var. *linearis*	Victoria, Knight 127, 1887	N.D.
Pluerotheliopsis australiensis	Queensland, Bailey 562, 1889	N.D.
Pleurotrema pyrenuloides	Queensland, Dr. C.Knight 49,50,51, 45,25,314,317, 1887	Syntypes
Pyxine retirugella var. *endoxantha* f. *sorediosa*	Java, 1882 Queensland, Knight 16, 1887 Queensland, Knight 17, 1887	Syntype Syntype Syntype
Ramalea cochleata	Queensland, Shirley 18 Sandringham, Victoria, F.R.M.Wilson 19 Victoria, Knight 322, 1887	Syntype Syntype Syntype
Ramalina aggregata	Queensland, Shirley 19, 1891	Holotype
Ramalina farinacea var. *dendroides*	Ash Island, Hunter River, E.Forde, communicated by F.v.Mueller 1881	N.D.
Ramalina farinacea var. *nervulosa*	Daintree River, Queensland, G.Pentzke, comm. by F.v.Mueller 1882	N.D.
Ramalina farinacea var. *squarrosa*	Rockhampton, Queensland, Mrs. Thozet, comm. by F.v.Mueller 1881	N.D.
Ramalina fastigiatula	Grampians, D.Sullivan 14, comm. by F.v.Mueller 1882	N.D.
Ramalina fissa	King's Island inter Melbourne et Tasmania, C.French comm. by F.v.Mueller 1888	N.D.
Ramalina glaucescens	Mt. Ararat, auf Astchen	N.D.
Ramalina lacerata	Eucla, Western Australia, J.Oliver 1882	N.D.
Ramalina myrioclada	Twofold Bay, N.S.W., Tyrone White, comm. by F.v. Mueller 1882	N.D.
Toninia australiensis	Australia felix, Dr. F.Mueller (ex Herb. Hampe)	N.D.
Toninia nitidum	Summit of Mt. Kosciusko, F.v.Mueller, 1884 Summit of Mt. Hotham, Victoria, F.R.M.Wilson 1157, 1893	Syntype Syntype
Tremotylium australiense	Toowoomba, Queensland, Hartmann	N.D.
Tremotylium nitidulum	Brisbane, Queensland, Bailey 367, 1891	N.D.
Tylophoron triloculare	Brisbane, Queensland, Bailey 1533, 1891	N.D.

Taxon	Locality	Status
Usnea angulosa	Upper Swan River, W.A., Miss Sewell, comm. by F.v.Mueller 1885	N.D.
Usnea microcarpodes	Clarence River, Australia, Wilcox, comm. by F.v.Mueller 1881	N.D.
Usnea tasmanica	Van Dieman's Land, Astrolabe 31, comm. by de Franquer 1878	N.D.
Usnea torulosa	Mt. Kosciusko, N.S.W., Findlay	N.D.

CHEMISTRY OF LICHEN TYPE SPECIMENS HOUSED IN THE BRITISH MUSEUM (BM) AND THE CONSERVATOIRE ET JARDIN BOTANIQUES, GENEVA (G).

BM *Anzia colpodes*
Atranorin, divaricatic acid

BM *Anzia angustata*
Divaricatic acid and unknown

BM *Anzia semiteres*
Divaricatic acid

BM *Baemomyces fungoides*
Baeomycesic acid, squamatic acid

BM *Baeomyces fusco-carneus*
Norstictic acid, connorstictic acid

BM *Chondropsis semiviridis*
Usnic acid, protocetraric acid, fumarprotocetraric acid

BM *Lepraria citrina*
Pinartic acid

BM *Lichen plicatus* (Linnaean Herbarium as type for *Usnea plicatus*)
Usnic acid, salazinic acid

BM *Lobaria crenulata*
Gyrophoric acid, congyrophoric acid

BM *Menegazzia aeneofusca*
Stictic acid, constictic acid, norstictic acid (trace), Atranorin, and two unknowns

BM *Menegazzia dispora*
Atranorin, quintaria complex (three pink spots)

BM *Menegazzia pertransita*
Atranorin, stictic acid, constictic acid, two unknowns

BM *Menegazzia retipora*
Atranorin, stictic acid, unknown

BM *Menegazzia subpertusa*
Atranorin, stictic acid, constictic acid, two unknowns

BM *Neophyllis melacarpa*
Grayanic acid, unknown violet pigment

BM *Ocellularia leucotylia*
Psoromic acid

G *Parmelia amphixantha* Holotype
Usnic acid, norstictic acid, stictic acid

BM *Parmelia australiensis*
Usnic acid, loxodic acid

BM *Parmelia austro-africana*
Protocetraric acid
BM *Parmelia brisbanensis*
Atranorin, vulpinic acid
BM *Parmelia ciliifera*
Atranorin, alectoronic acid, gyrophoric acid
G *Parmelia conspersa* var. *constrictans* f. *isidiophora* Holotype
Usnic acid, salazinic acid, norstictic acid
G *Parmelia conspersa* var. *laxa* Syntype
Usnic acid, salazinic acid
G *Parmelia conspersa* var. *strigosa* Holotype
Usnic acid, norstictic acid, salazinic acid
G *Parmelia conspersa* var. *laxa* f. *isidiigera* Holotype
Usnic acid, salazinic acid
G *Parmelia conspersa* var. *strigosa* Holotype
Usnic acid, norstictic acid, salazinic acid
G *Parmelia conspersa* var. *stenophylla* f. *isidiosa* Lectotype
Usnic acid, salazinic acid
G *Parmelia conspersa* var. *stenophylloides* Syntype
Usnic acid, norstictic acid
BM *Parmelia dilatata*
Protocetraric acid, usnic acid (trace)
BM *Parmelia erubescens*
Atranorin, salazinic acid
G *Parmelia ferax* Holotype
Usnic acid, protocetraric acid, physodalic acid
G *Parmelia furcata* Holotype
Usnic acid, loxodic acid
G *Parmelia gracilis* Holotype
Usnic acid, protocetraric acid, caperatic acid
G *Parmelia hospitans* Syntype
Atranorin, paraphysodic acid, physodic acid, conphysodic acid, and unknown below protocetraric in HE.
BM *Parmelia hypoclystoides* Holotype
Usnic acid, salazinic acid, norstictic acid
G *Parmelia hypoleuca* Holotype
Lecanoric acid
G *Parmelia hypoleuca* f. *coralloidea* Holotype
Lecanoric acid
BM *Parmelia obversa*
Usnic acid, physodalic acid
G *Parmelia ochroleuca* Holotype
Usnic acid, protocetraric acid, caperatic acid
G *Parmelia ochroleuca* var. *sorediosa* Syntype
Usnic acid, protocetraric acid
G *Parmelia permutata*
Gyrophoric acid, pigment
G *Parmelia physodes* var. *leucina*
Atranorin, physodic acid, conphysodic acid
G *Parmelia physodes* var. *rugosa* Syntype
Atranorin, physodic acid, conphysodic acid, physodalic acid, protocetraric acid, paraphysodic acid
G *Parmelia physodes* var. *tenuis* Syntype
Atranorin, physodic acid, conphysodic acid, physodalic acid, protocetraric acid, paraphysodic acid
BM *Parmelia platycarpa*
Atranorin, stictic acid

G *Parmelia proboscidea* var. *aspera* Syntype
Salazinic acid
G *Parmelia pruinata* Holotype
Atranorin, lecanoric acid
BM *Parmelia reparata*
Atranorin, salazinic acid
BM *Parmelia rutidota*
Usnic acid, protocetraric acid, caperatic acid
BM *Parmelia subalbicans*
Atranorin, lecanoric acid
G *Parmelia tenuirima* f. *coralloidea* Lectotype
Atranorin, salazinic acid
G *Parmelia tenuirima* f. *isidiosa* Holotype
Atranorin, salazinic acid
G *Parmelia tiliacea* var. *rugulata* Syntype
Atranorin, protocetraric acid
G *Parmelia tiliacea* var. *stenophylla* Holotype
Atranorin, protocetraric acid
G *Parmelia tiliacea* var. *convexula* Holotype
Atranorin, protocetraric acid
G *Parmelia tiliacea* var. *feracissima* Holotype
Fatty acids
G *Parmelia versicolor* Holotype
Usnic acid, salazinic acid
G *Parmelia virens* var. *sorediata* Holotype
Atranorin, salazinic acid
G *Parmelia xanthomelana* Holotype
Stictic acid
G *Ramalina farinacea* var. *dendroides*
Sekikaic acid aggregate
G *Ramalina farinacea* var. *nervulosa*
Divaricatic acid
G *Ramalina farinacea* var. *squarrosa*
Sekikaic acid aggregate
G *Ramalina fissa*
Salazinic acid
G *Ramalina inflata*
Divaricatic acid
G *Ramalina lacerata*
No medullary substances
G *Ramalina myrioclada*
No medullary substances
BM *Siphula erosa*
Thamnolic acid
BM *Thysanothecium hyalinum*
Usnic acid, divaricatic acid
BM *Usnea baileyi*
Norstictic acid, pigment
BM *Usnea formosa*
Usnic acid, pigment (cf. *U. baileyi*)
BM *Usnea implicata*
Usnic acid, salazinic acid, norstictic acid
BM *Usnea molliuscula*
Usnic acid, salazinic acid
BM *Usnea strigosa*
Norstictic acid, pigment

WESTERN AUSTRALIAN HERBARIUM RESEARCH NOTES

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THE DISTRIBUTION OF LICHENS IN WESTERN AUSTRALIA

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ABSTRACT

Distribution maps based on a 1° lat. x 1.5° long. grid system are given for 192 species of Western Australian lichens.

INTRODUCTION

Lichens have been shown to be very sensitive to low level toxic gas pollution as well as other environmental disturbances. In Britain, they have been extensively mapped and with good collections over the years, mappers have been able to demonstrate the decline of certain lichen species and morphological types with the increase in urbanisation and the spread of industrialisation.

As a widespread element in the cryptogamic flora, lichens occur in varying habitats and climatic regimes. Although abundant, they have until recently been poorly collected, and current distribution maps for many species reveal a lack of collecting effort rather than confined or restricted distribution. The microlichens, small inconspicuous species occurring on tree bark and on rocks, are not well represented in many herbaria collections. It is interesting to note that highly coloured or conspicuous macrolichens are rather well collected by non-lichenologists thus providing better distribution data. The taxonomy of many species remains uncertain pending taxonomic revisions.

The purpose of this paper is to publish the current knowledge and distribution of this neglected group of cryptogams. These maps will serve as the baseline for biogeographic studies, although they could also be useful for ecological and taxonomic studies.

Maps showing species distribution have been arranged alphabetically according to species names and the authority for each species is given. The system of indicating the distribution follows that of Hnatiuk and Maslin (1980) for the genus *Acacia* in Western Australia. Type specimens, where present, are indicated with an (*) and the grid cell enhanced. However, where the precise locality is not known, no enhancement is made. The 192 lichen species occurring in 88 grid cells are listed in Table 1.

The distributional data were originally collated from the author's collections (1967 yo present). Part of this collection is now housed in the Western Australian Herbarium (PERTH). For more comprehensive and historical distribution data, herbarium specimens housed in various other institutions were also examined. All locality data collated have been compiled by the author into a separate work entitled "Distribution Information for Western Australian Lichens". Copies of this work have been lodged with the Western Australian Herbarium (PERTH) and with the Bureau of Flora and Fauna, Canberra.

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REFERENCE

Hnatiuk, R.J. and Maslin, B.R. (1980). The distribution of *Acacia* (Leguminosae-Mimosoideae) in Western Australia. Park 1. Individual species distribution. *W. Austral. Herb. Res. Notes* 4: 1-103.

Table 1. List of lichen species occurring in 1^{o} x 1.5^{o} grid cells

Cell 104	1 species
Rocella sp.	
Cell 105	6 species
Buellia punctata	*Diploschistes scruposus*
Buellia retrovertens	*Dirinaria aegialita*
Caloplaca fulgens	*Graphis afzelii*
Cell 108	12 species
Arthrothelium interveniens	*Microthelia micula*
Caloplaca fulgens	*Parmelia dilatata*
Candelariella vitellina	*Parmelia praesorediosa*
Chaenotheca melanophaea	*Parmelia tinctorum*
Lecidea contigua	*Pyxine coccifera*
Lepraria candelaris	*Ramalina celastri*

Cell 109	2 species
Bacidia microphyllina	*Lepraria membranaceae*
Cell 110	1 species
Acarospora schleicheri	
Cell 112	1 species
Ramalina celastri	
Cell 113	1 species
Pyxine petricola	
Cell 116	6 species
Acarospora schleicheri	*Catillaria* sp.
Arthropyrenia var. *fallax*	*Dirinaria applanata*
Caloplaca fulgens	*Pyxine petricola*
Cell 120	2 species
Acarospora schleicheri	*Caloplaca fulgens*
Cell 129	4 species
Acarospora novaehollandiae	*Acarospora sinopica*
Acarospora schleicheri	*Lecidea crystallifera*
Cell 134	5 species
Acarospora schleicheri	*Caloplaca fulgens*
Anema sp.	*Peccania* sp.
Buellia disciformis	
Cell 141	1 species
Acarospora schleicheri	
Cell 144	2 species
Acarospora schleicheri	*Anema* sp.
Cell 145	1 species
Anema sp.	
Cell 146	1 species
Lichenothelia scopularia	
Cell 156	1 species
Diploschistes scruposus	
Cell 165	2 species
Lecidea decipiens	*Xanthoria ectanea*
Cell 169	1 species
Acarospora schleicheri	
Cell 176	6 species
Buellia subalbula	*Pyxine petricola*
Lecanora sphaerospora	*Ramalina celastri*
Lecidea decipiens	*Xanthoria ectanea*
Cell 177	2 species
Acarospora schleicheri	*Parmelia plittii*

Cell 178	2 species
Acarospora schleicheri	*Lecidea decipiens*
Cell 187	1 species
**Lecidea ochroleuca*	
Cell 190	2 species
Lecidea crystallifera	*Lecidea decipiens*
Cell 196	1 species
Parmelia refringens	
Cell 197	2 species
Heppia euploca	*Peltula euploca*
Cell 201	2 species
Lecidea decipiens	*Usnea scabrida*
Cell 202	1 species
Diploschistes subocellatus	
Cell 204	1 species
Acarospora schleicheri	
Cell 205	1 species
Peltula euploca	
Cell 206	2 species
Lecidea decipiens	*Synalissa* sp.
Cell 210	1 species
Parmelia scabrosa	
Cell 213	6 species
Acarospora schleicheri	*Parmelia subalbicans*
Parmelia callifolia	*Teloschistes chrysopthalmus*
Parmelia incantata	*Xanthoria ectanea*
Cell 215	3 species
Diploschistes scruposus	*Heterodea muelleri*
Diploschistes subocellatus	
Cell 216	2 species
Acarospora schleicheri	*Caloplaca aurantiaca*
Cell 217	4 species
Acarospora schleicheri	*Parmelia plittii*
Buellia subalbula	*Synalissa* sp.
Cell 219	1 species
Parmelia pulla	
Cell 224	20 species
Acarospora schleicheri	*Heterodea muelleri*
Candelariella vitellina	*Lecidea contigua*
Cladia corallaizon	*Lecidea decipiens*
Diploschistes scruposus	*Ochrolechia subpallescens*
Haematomma eremaeum	*Parmelia rutidota*

Cell 224 (cont.)
Parmelia subalbicans
Pertusaria leioplaca
Physcia stellaris
Pyxine cocoes
Ramalina inflata
Siphula coriacea
Teloschistes chrysopthalmus
Usnea scarbida
Xanthoria ectanea
Xanthoria parietina

Cell 225 — 5 species
Cladia corallaizon
Parmelia conspersa
Physcia stellaris
Teloschistes chrysopthalmus
Usnea scabrida

Cell 226 — 3 species
Parmelia conspersa
Parmelia verrucella
Siphula coriacea

Cell 229 — 1 species
Acarospora schleicheri

Cell 231 — 4 species
Acarospora schleicheri
Dermatocarpon compactum
Fulgensia bracteata
Lecidea decipiens

Cell 234 — 6 species
Parmelia rutidota
Parmelia subalbicans
Pertusaria leioplaca
Physcia stellaris
Teloschistes chrysopthalmus
Usnea scabrida

Cell 235 — 4 species
Ramalina inflata
Siphula coriacea
Teloschistes chrysopthalmus
Usnea scabrida

Cell 236 — 5 species
Diploschistes scruposus
Parmelia callifolia
Parmelia scabrosa
Parmelia terrestris
**Parmelia tokajensis*

Cell 237 — 10 species
Buellia disciformis
Diploschistes subocellatus
Haematoma eremaeum
**Haematomma pruinosum*
Lecidea contigua
Parmelia callifolia
Parmelia conspersa
Siphula coriacea
Xanthoria ectanea
Xanthoria parietina

Cell 238 — 4 species
Acarospora schleicheri
Aspicilia calcarea
Parmelia callifolia
Parmelia rutidota

Cell 240 — 1 species
Parmelia pulla

Cell 245 — 19 species
Blastenia sp.
Buellia punctata
Caloplaca aurantiaca
Haematomma eremaeum
Heterodea muelleri
Ochrolechia subpallescens
Parmelia callifolia
Parmelia ferax
Parmelia nebulosa
Parmelia pruinata
Parmelia reptans
Parmelia rutidota

Cell 245 (cont.)
Parmelia subalbicans
Parmelia tinctina
Parmelia willisii
Pertusaria leioplaca
Teloschistes chrysopthalmus
Usnea barbata
Usnea scabrida

Cell 246 — 8 species
Cladia corallaizon
Diploschistes scruposus
Diploschistes subocellatus
Heterodea muelleri
Lecidea decipiens
Parmelia convoluta
Siphula coriacea
Xanthoria ectanea

Cell 247 — 4 species
Blastenia sp.
Parmelia rutidota
Physcia stellaris
Siphula coriacea

Cell 248 — 24 species
Acarospora schleicheri
Aspicilia calcarea
**Buellia glomerulans*
Buellia subalbula
**Buellia subcoronata*
Chondropsis semiviridis
Dermatocarpon lachneum
Diploschistes subocellatus
Diploschistes scruposus
Heterodea beaugleholei
Heterodea muelleri
Lecidea decipiens
Parmelia callifolia
Parmelia cheelii
Parmelia metaclystoides
Parmelia plittii
Parmelia pulla
Parmelia reptans
Parmelia terrestris
Parmelia tinctina
Parmelia verrucella
Peltula euploca
Siphula coriacea
Synalissa sp.

Cell 249 — 1 species
Parmelia rutidota

Cell 251 — 5 species
Aspicilia calcarea
Lecanora sphaerospora
Lecidea decipiens
Peltula omphaliza
Peltula placodizans

Cell 253 — 13 species
Aspicilia calcarea
Buellia subalbula
Caloplaca aurantiaca
Chondropsis semiviridis
Collema coccophorum
Diploschistes subocellatus
Lecanora sphaerospora
Lecidea crystallifera
Lecidea decipiens
Lecidea planata
Ochrolechia subpallescens
Teloschistes chrysopthalmus
Xanthoria parietina

Cell 255 — 41 species
Aspicilia calcarea
Buellia disciformis
Buellia subalbula
Calicium sp.
Caloplaca aurantiaca
Caloplaca fulgens
Candelariella vitellina
Cladia aggregata
Cladia corallaizon
Cadonia cariosa
Cladonia calycantha
Cladonia verticillata
Coccocarpia erythroxili
Dermatocarpon hepaticum
Diploschistes subocellatus
Diploschistes scruposus
Ephebe lanata
Fulgensia bracteata
Heterodea muelleri
Lecidea contigua

Cell 255 (cont.)

Lecidea planata
Leptogium ohyllocarpum
Parmelia conspersa
Parmelia incantata
Parmelia perlata
Parmelia rutidota
Pertusaria leioplaca
Physcia caesia
Pseudocyphellaria australiensis
Pseudocyphellaria crocata
Ramalea cochleata
Ramalina calicaris
Ramalina inflata
Thysanothecium hookeri
Thysanothecium hyalinum
Toninia cumullata
**Usnea anguloca*
Usnea scabrida
Verrucaria maura
Xanthoria ectanea
Xanthoria parietina

Cell 256 — 15 species

Chondropsis semiviridis
Cladia aggregata
Cladia corallaizon
Diploschistes scruposus
Fulgensia bracteata
Heterodea muelleri
Lecidea contigua
Heterodea beaugleholei
Lecidea crystallifera
Parmelia australiensis
Parmelia conspersa
Parmelia pulla
Siphula coriacea
Teloschistes chrysopthalmus
Thysanothecium hyalinum

Cell 257 — 14 species

Chondropsis semiviridis
Diploschistes scruposus
Diploschistes subocellatus
Heterodea beugleholei
Heterodea muelleri
Lecidea crystallifera
Lecidea decipiens
Parmelia incrustata
Parmelia pulla
Parmelia scabrosa
Ramalea cochleata
Siphula coriacea
Teloschistes chrysopthalmus
Xanthoria ectanea

Cell 258 — 8 species

Collema coccophorum
Diploschistes subocellatus
Heterodea beaugleholei
Heterodea muelleri
Lecidea contigua
Lecidea crystallifera
Parmelia rutidota
Siphula coriacea

Cell 259 — 17 species

Acarospora schleicheri
Aspicilia calcarea
Chondropsis semiviridis
Diploschistes scruposus
Diploschistes subocellatus
Heterodea beaugleholei
Heterodea muelleri
**Lecanora sphaerospora*
Lecidea contigua
Lecidea crystallifera
Lecidea decipiens
Parmelia callifolia
Parmelia incantata
Parmelia pruinata
Parmelia pulla
Parmelia reptans
Parmelia rutidota

Cell 260 — 2 species

Candelaria concolor
Heterodea beaugleholei

Cell 261 — 5 species

Buellia subalbula
Diploschistes scruposus
Heterodermia japonica
Lecidea decipiens
Teloschistes chrysopthalmus

Cell 262 — 5 species
Collema coccophorum
Parmelia callifolia
Parmelia convoluta
Parmelia willisii
Teloschistes chrysopthalmus

Cell 263 — 14 species
Aspicilia calcarea
Buellia subalbula
Chondropsis semiviridis
Diploschistes subocellatus
Fulgensis bracteata
Lecidea decipiens
Parmelia callifolia
Parmelia convoluta
Ramalina celastri
Ramalina evernioides
Ramalina lacerata
Teloschistes chrysopthalmus
Toninia caeruleonigricans
Xanthoria ectanea

Cell 264 — 42 species
Aspicilia calcarea
Buellia subalbula
Caloplaca aurantiaca
Chondropsis semiviridis
Cladia aggregata
Cladia ferdinandii
Cladonia amaurocraea
Cladonia calycantha
Cladonia chlorophaea
Cladonia coniocraea
Cladonia verticillata
Cladonia xanthoclada
Diploschistes scruposus
Ephebe lanata
Haematomma eremaeum
Heterodea beaugleholei
Hecterodea muelleri
Lecidea laeta
Lecidea contigua
Lecidea decipiens
Lecidea planata
Menegazzia caesiopruinosa
Menegazzia platytrema
Pannoparmelia wilsonii
Parmelia australasica
Parmelia cheelii
Parmelia hypoprotocretrarica
Parmelia notata
Parmelia rutidota
Parmelia tinctina
Ramalea cochleata
Siphula coriacea
Spilonema paradoxum
Teloschistes chrysopthalmus
Thysanothecium hookeri
Usnea arida
Usnea inermis
Usnea scabrida
Usnea torulosa
Verrucaria maura
Xanthoria ectanea
Xanthoria parietina

Cell 265 — 33 species
Buellia disciformis
Caloplaca aurantiaca
Caloplaca citrina
Caloplaca ferruginea
Caloplaca fulgens
Candelariella vitellina
Catillaria sp.
Cladia aggregata
Cladia corallaizon
Cladonia amaurocraea
Cladonia calycantha
Dermatocarpon lachneum
Diploschistes scruposus
Ephebe lanata
Haematomma eremaeum
Lecanora cancriformis
Lecidea decipiens
Leprocaulon microscopicum
Parmelia conspersa
Parmelia hypoprotocetrarica
Parmelia imitatrix
Parmelia pruinata
Parmelia rutidota
Parmelia subalbicans
Physcia stellaris
Ramalea cochleata
Ramalina calicaris
Ramalina geniculata
Siphula coriacea
Teloschistes chrysopthalmus
Usnea consimilis
Usnea inermis
Usnea scabrida

Cell 266 — 33 species

Acarospora novaehollandiae
Acarospora schleicheri
Caloplaca aurantiaca
Caloplac ferruginea
Caloplaca fulgens
Candelariella spraguei
Candelariella vitellina
Chondropsis semiviridis
Cladia aggregata
Cladia corallaizon
Cladia ferdinandii
Caldonia xanthoclada
Collema coccophorum
Dermatocarpon lachneum
Diploschistes scruposus
Endocarpon helmsianum
Haematomma eremaeum
Heterodea beaugleholei
Heterodea muelleri
Lecidea laeta
Lecidea croactata
Lecidea crystallifera
Lecidea decipiens
Ochrolechia subpallescens
Parmelia cheelii
Parmelia convoluta
Parmelia pulla
Parmelia rutidota
Ramalina inflata
Siphula coriacea
Teloschistes chrysopthalmus
Thysanothecium hyalinum
Usnea scarbida

Cell 268 — 14 species

Fulgensia bracteata
Heterodea beaugleholei
Lecidea decipiens
Lepraria membranaceae
**Lichina minutissima*
Parmelia cheelii
Parmelia conspersa
Parmelia imitatrix
Parmelia quercina
Parmelia rutidota
Teloschistes chrysopthalmus
Usnea scabrida
Usnea xanthopoga
Xanthoria ectanea

Cell 269 — 8 species

Buellia subalbula
Chondropsis semiviridis
Diploschistes scruposus
Lecidea decipiens
Parmelia callifolia
Parmelia imitatrix
Parmelia pumila
Usnea arida

Cell 270 — 4 species

Chondropsis semiviridis
Collema coccophorum
Fulgensia bracteata
Lecidea decipiens

Cell 271 — 4 species

Parmelia rutidota
Ramalina celastri
Ramalina inflata
Xanthoria ectanea

Cell 273 — 11 species

Caloplaca aurantiaca
Cladia aggregata
Collema glaucopthalmum
Heterodermia obscurata
Leptogium phyllocarpum
Ochrolechia subpallescens
Parmelia cooperi
Parmelia rutidota
Teloschistes chrysopthalmus
Usnea scabrida
Xanthoria parietina

Cell 274 — 26 species

Caloplaca citrina
Caloplaca cerina
Cladia aggregata
Cladia ferdinandii
Cladonia degenerans
Cladonia krempelhuberi
Cladonia verticillata
Collema glaucopthalmum
Hypogymnia pulchrilobata
Hypogymnia suphysodes var. *austrerodioides*
Hypogymnia subphysodes var. *subphysodes*
Lecanora atra

Cell 274 (cont.)
Lepraria candelaris
Menegazzia platytrema
Pannoparmelia wilsonii
Parmelia conspersa
Parmelia mexicana
Parmelia perlata
Parmelia reticulata
Pseudocyphellaria australiensis
Ramalina celastri
Teloschistes chrysopthalmus
Thysanothecium hookeri
Thysanothecium hyalinum
Trapelia sp.
Xanthoria parietina

Cell 275
20 species
Caloplaca ferruginea
Chondropsis semiviridis
Cladonia amaurocraea
Diploschistes scruposus
**Haematomma eremaeum*
Heterodea muelleri
Hypogymnia pulchrilobata
Lecidea decipiens
Lecidea planata
Parmelia callifolia
Parmelia conspersa
Parmelia ferax
Parmelia mexicana
Parmelia plittii
Parmelia rutidota
Parmelia willisii
Ramalina inflata
Siphula coriacea
Teloschistes chrysopthalmus
Usnea scabrida

Cell 276
34 species
Blastenia sp.
Buellia disciformis
Buellia punctata
Buellia stellulata
Caloplaca citrina
Chondropsis semiviridis
Cladia aggregata
Cladia ferdinandii
Cladonia verticillata
Collema coccophorum
Diploschistes scruposus
Fulgensia bracteata
Haematomma eremaeum
Heterodea muelleri
Lecidea decipiens
Parmelia callifolia
Parmelia cheelii
Parmelia mexicana
Parmelia pruinata
Parmelia pulla
Parmelia reptans
Parmelia rutidota
Parmelia terrestris
Parmelia verrucella
Ramalina celastri
Ramalina geniculata
Ramalina inflata
Siphula coriacea
Teloschistes chrysopthalmus
Toninia caeruleonigricans
Usnea scabrida
Usnea xanthopoga
Xanthoria ectanea
Xanthoria parietina

Cell 277
13 species
Buellia stellulata
Caloplaca fulgens
Catillaria sp.
Cladia aggregata
Cladia ferdinandii
Dermatocarpon lachneum
Heterodea muelleri
Lepraria membranaceae
Parmelia callifolia
Parmelia harrisii
Parmelia rutidota
Peltula euploca
Xanthoria ectanea

Cell 278
14 species
Aspicilia calcarea
Cladia aggregata
Cladia ferdinandii
Cladonia degenerans
Diploicia canescens
Diploschistes scruposus
Heterodea muelleri
Lecanora atra
Lepraria candelaris
Parmelia conspersa
Parmelia reticulata
Ramalina calicaris
Siphula coriacea
Xanthoria ectanea

Cell 279 — 3 species

Diploschistes subocellatus
Ramalina geniculata
Teloschistes chrysopthalmus

Cell 280 — 6 species

Buellia subdisciformis
Cladia aggregata
Cladonia krempelhuberi
Lecanora atra
Usnea torulosa
Xanthoria parietina

Cell 281 — 32 species

Aspicilia calcarea
Buellia subalbula
Caloplaca fulgens
Cladia aggregata
Cladia ferdinandii
Cladonia calycantha
Cladonia chlorophaea
Cladonia verticillata
Cladonia xanthoclada
Coccocarpia erythroxili
Collema glaucopthalmum
Dermatocarpon hepaticum
Fulgensia bracteata
Graphis scripta
Heterodermia obscurata
Lecidea decipiens
Menegazzia platytrema
Ochrolechia subpallescens
Pannaria rubiginosa
Pannoparmelia wilsonii
Parmelia perlata
Parmelia reticulata
Parmelia rutidota
Parmelia tasmanica
Peltigera dolichorhiza
Pseudocyphellaria australiensis
Pseudocyphellaria crocata
Ramalina celastri
Siphula coriacea
Thelotrema lepadinum
Thysanothecium hookeri
Usnea barbata

Cell 282 — 65 species

Arthonia sp.
Buellia stellulata
Calicium sp.
Caloplaca aurantiaca
Caloplaca ferruginea
Caloplaca fulgens
Catillaria sp.
Cladia aggregata
Cladia ferdinandii
Cladia schizopora
Cladonia amaurocraea
Cladonia calycantha
Cladonia cariosa
Cladonia chorophaea
Cladonia furcata
Cladonia pityrea
Cladonia polydactyla
Cladonia pyxidata
**Cladonia xanthoclada*
Coccocarpia erythroxili
Collema glaucopthalmum
Dermatocarpon lachneum
Ephebe lanata
Haematomma eremaeum
Heterodermia obscurata
Hypogymnia subphysodes var. *austrerioides*
Hypogymnia subphysodes var. *subphysodes*
Lecanora atra
Lepraria membranaceae
Menegazzia caesiopruinosa
Menegazzia paltytrema
Pannaria pityrea
Pannaria rubiginosa
Pannoparmelia wilsonii
Parmelia cheelii
Parmelia erumpens
Parmelia harrisii
Parmelia imitatrix
Parmelia perlata
Parmelia pruinata
Parmelia pulla
Parmelia rutidota
Parmelia subalbicans
Peltigera dolichorhiza
Peltigera spuria var. *erumpens*
Pertusaria leioplaca
Physcia endococcinea
Physcia stellaris
Placopsis sp.
**Porocyphus lichenelloides*
Pseudocyphellaria australiensis
Pseudocyphellaria crocata
Ramalea cochleata
Ramalina inflata
Rhizocarpon geographicum
Sarcogyne clavus
Stereocaulon corticatulum
Teloschistes chrysopthalmus

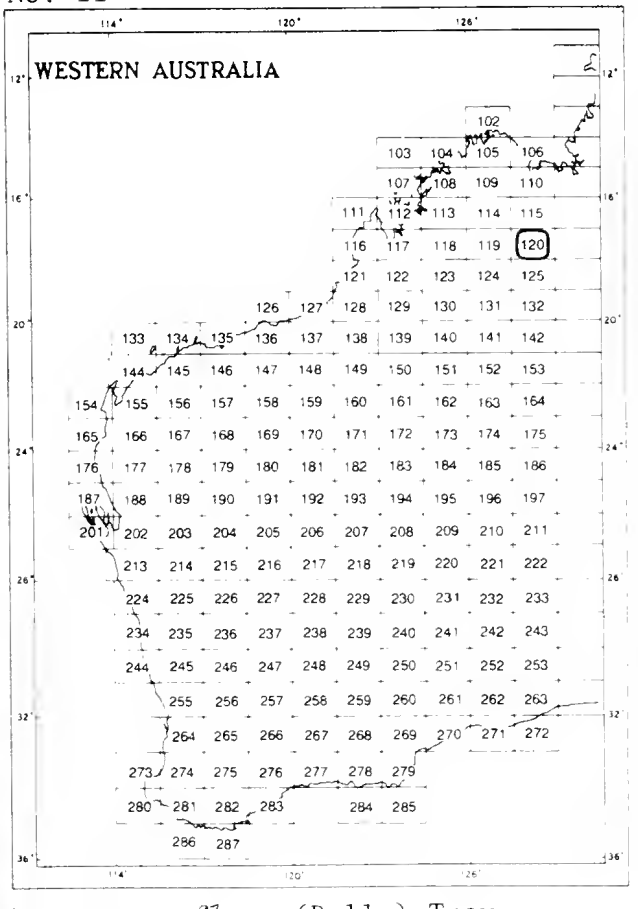
Cell 282 (cont.)
Thysanothecium hookeri
Thysanothecium hyalinum
Umbilicaria polyphylla
Usnea torulosa
Usnea scabrida
Usnea xanthopoga
Xanthoria parietina

Cell 283 — 14 species
Caloplaca fulgens
Cladia ferdinandii
Heterodermia obscurata
Lecidea laeta
**Parmelia antleriformis*
Parmelia rutidota
Parmelia tinctina
Ramalina calicaris
Ramalina geniculata
Teloschistes chrysopthalmus
Thysanothecium hyalinum
Usnea inermis
Xanthoria ectanea
Xanthoria parietina

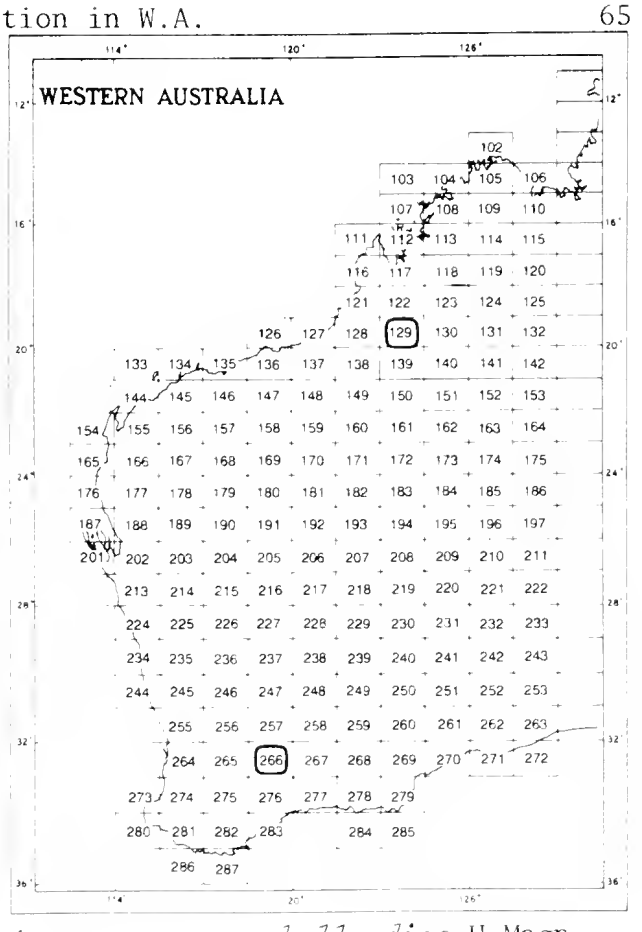
Cell 284 — 4 species
**Cladia ferdinandii*
Teloschistes chrysopthalmus
Teloschistes sieberianus
Xanthoria ectanea

Cell 285 — 2 species
Cladia aggregata
Lecidea laeta

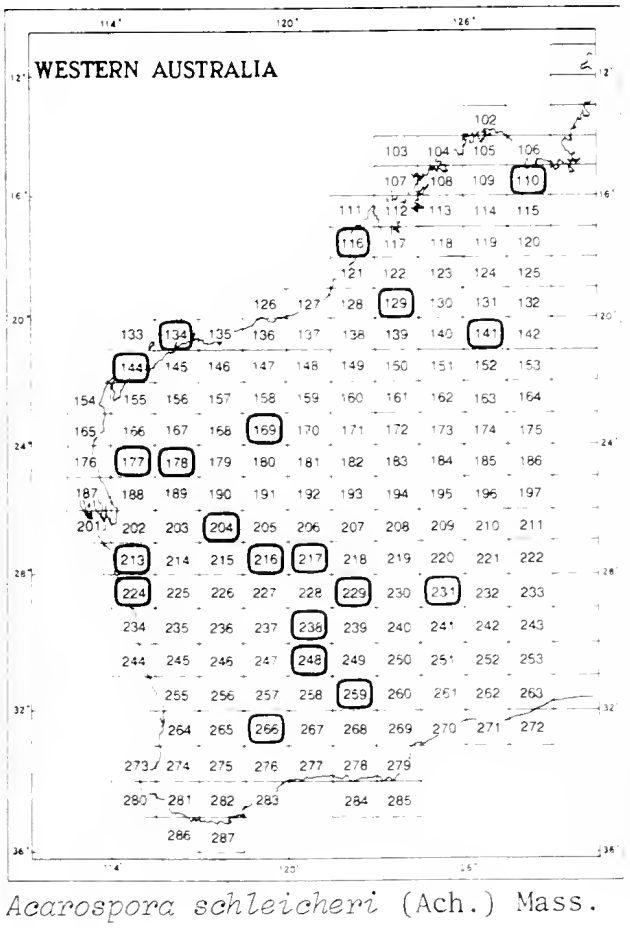
Cell 287 — 22 species
Bacidia aff. *sabuletorum*
Buellia stellulata
Caloplaca aurantiaca
Cladonia amaurocraea
Cladonia calycantha
Cladonia pityrea
Ephebe lanata
Graphis scripta
Heterodermia obscurata
Pannoparmelia wilsonii
Parmelia harrisii
Parmelia pulla
Parmelia reticulata
Parmelia subsumpta
Parmelia tinctina
Pertusaria leioplaca
Pseudocyphellaria aurata
Pseudocyphellaria australiensis
Pseudocyphellaria crocata
Sarcogyne clavus
Thysanothecium hyalinum
Xanthoria ectanea



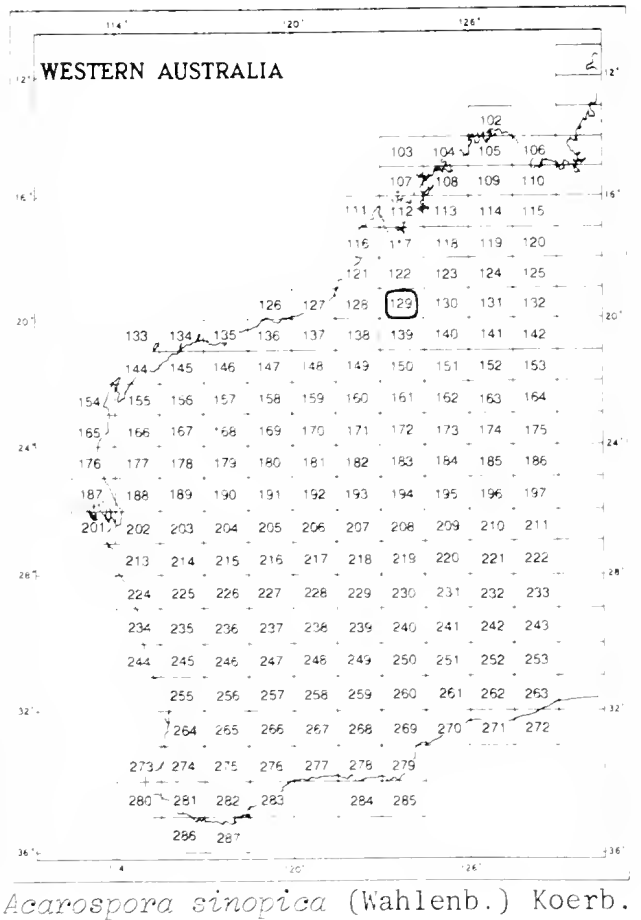
Acarospora flava (Bell.) Trev.



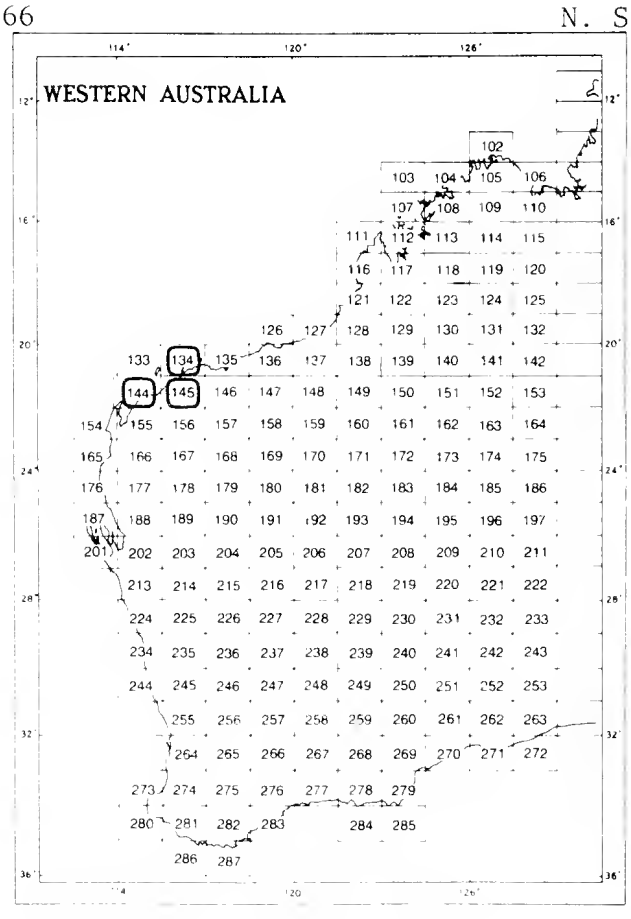
Acarospora novaehollandiae H.Magn.



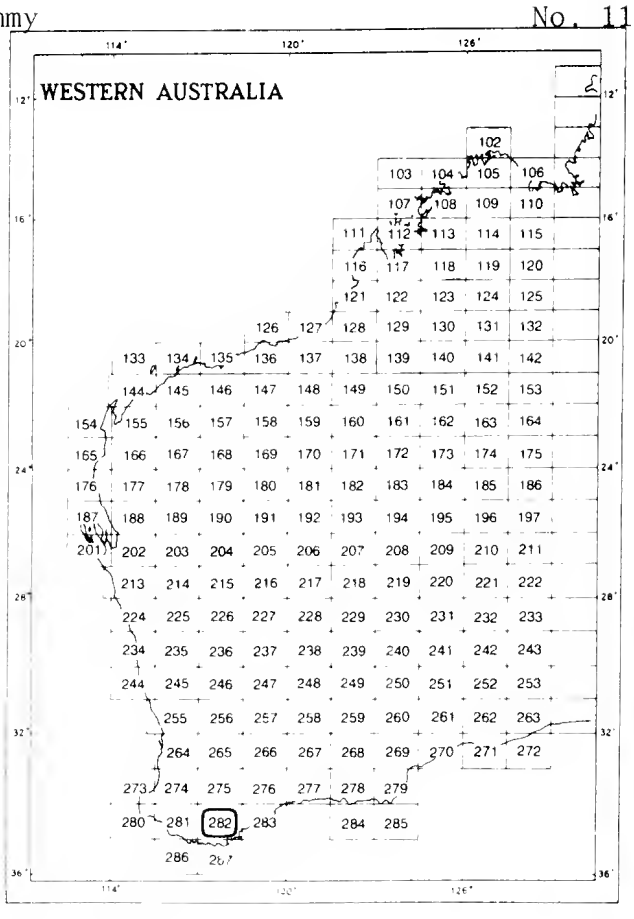
Acarospora schleicheri (Ach.) Mass.



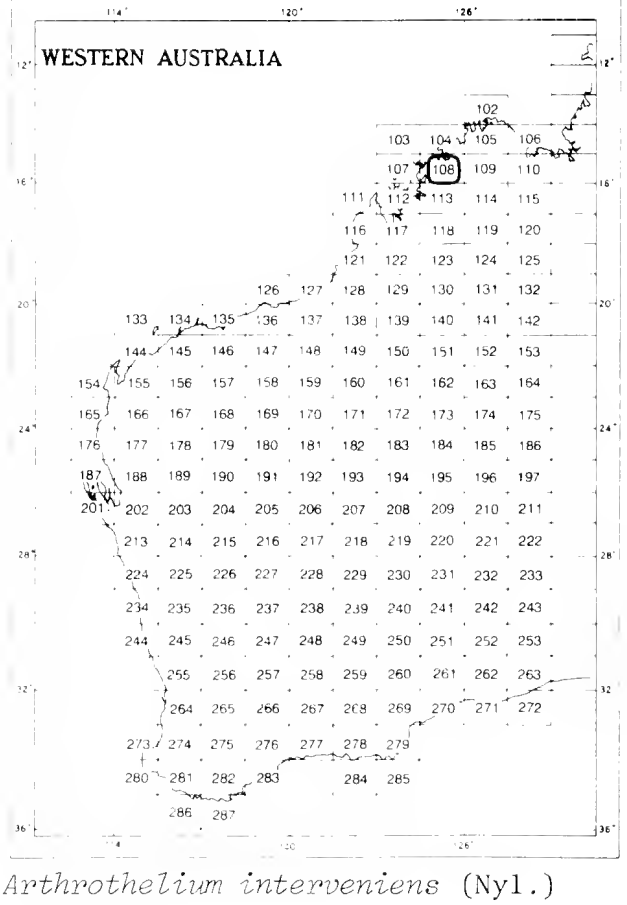
Acarospora sinopica (Wahlenb.) Koerb.



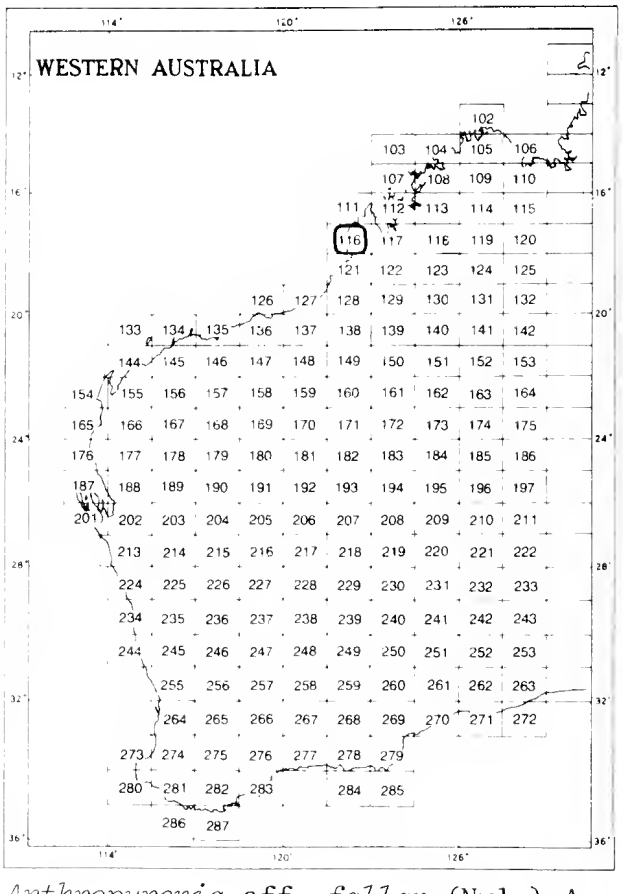
Anema sp.



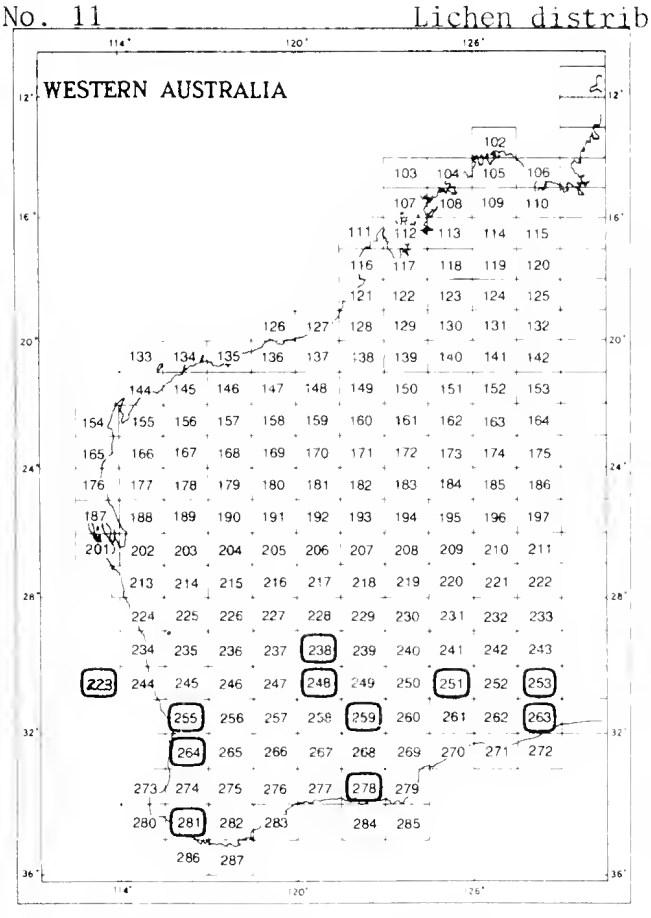
Arthonia sp.



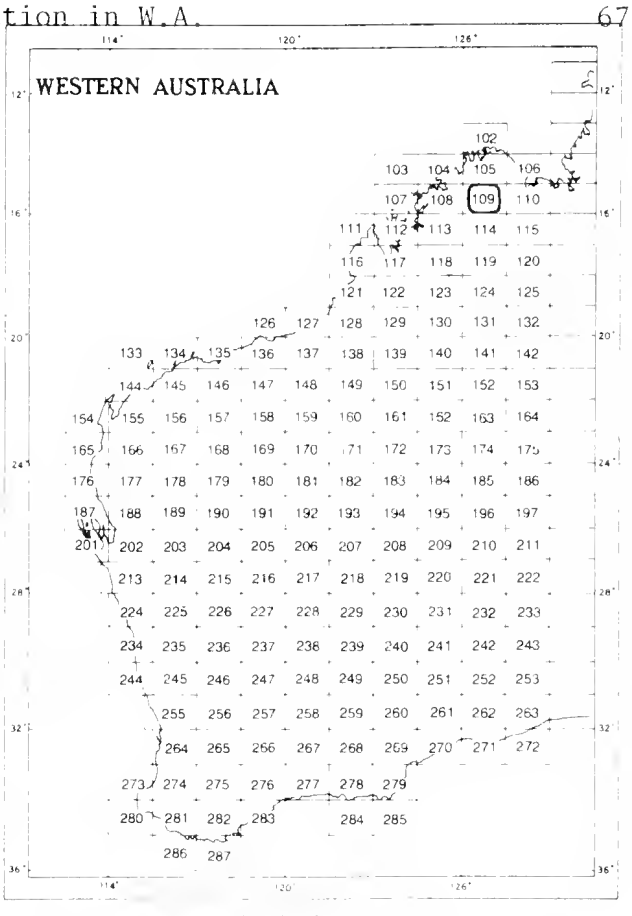
Arthrothelium interveniens (Nyl.) Zahlbr.



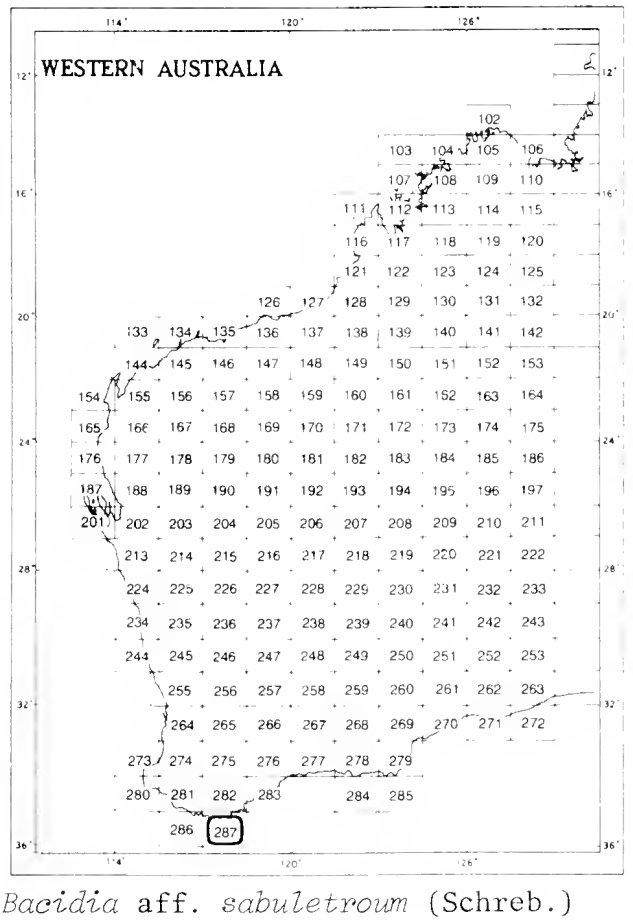
Arthropyrenia aff. *fallax* (Nyl.) Arn.



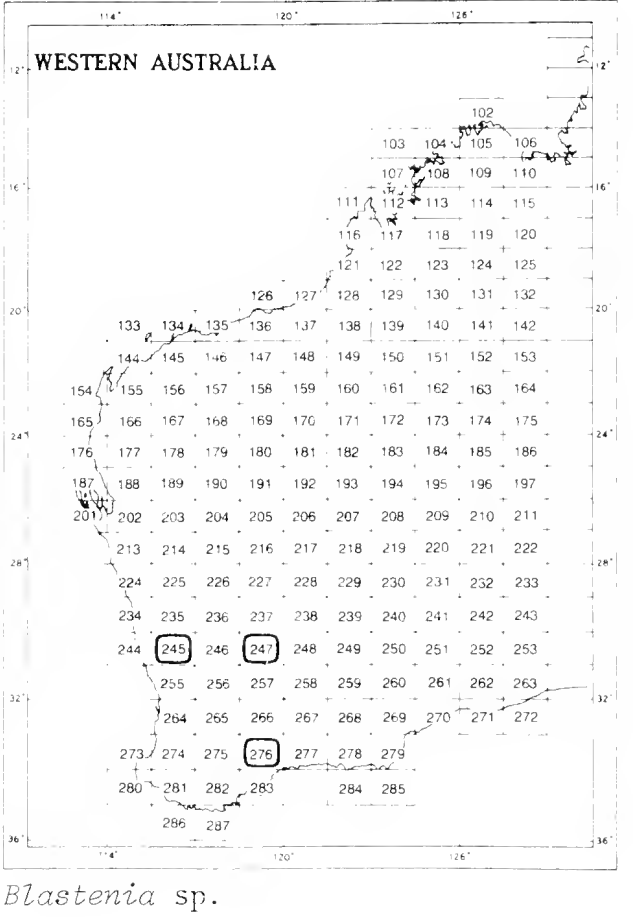
Aspicilia calcarea (L.) Mudd



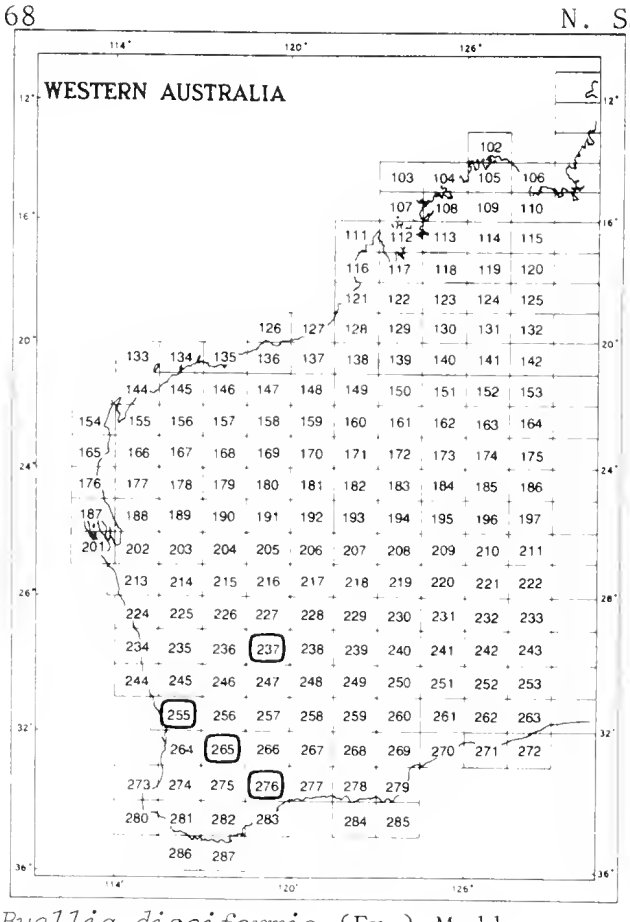
Bacidia microphyllina (Tuck.) Riddle



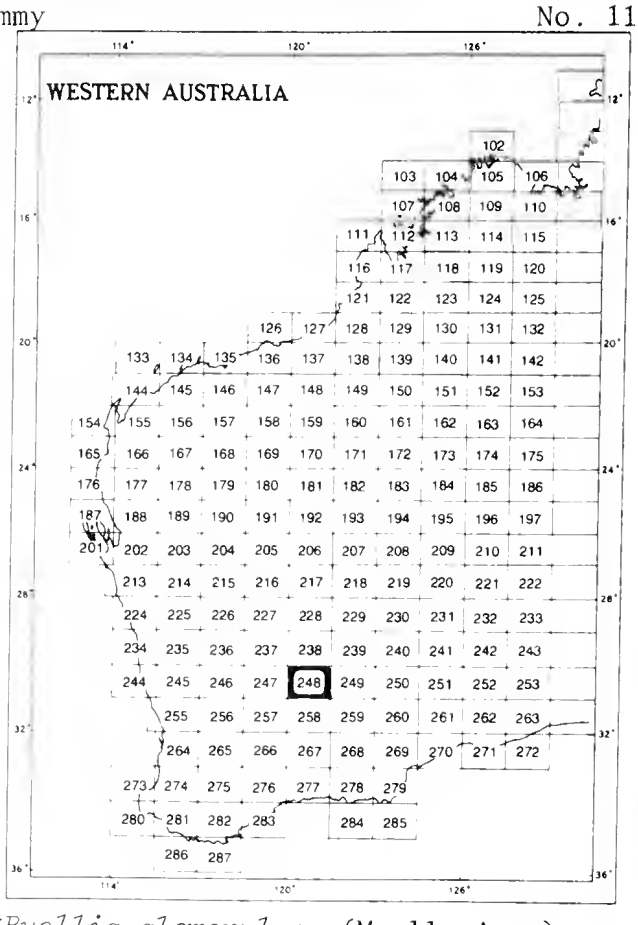
Bacidia aff. *sabuletroum* (Schreb.) Leh.



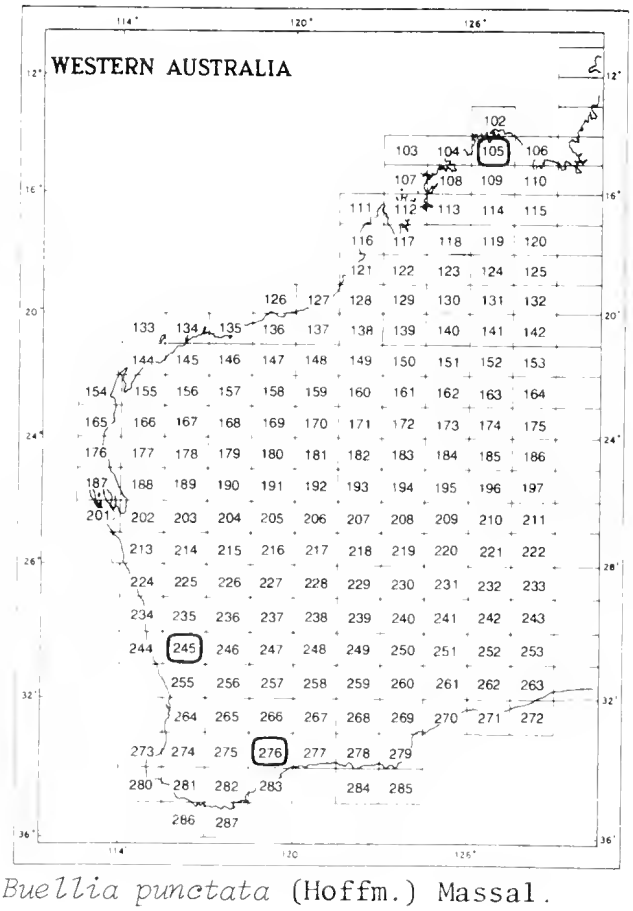
Blastenia sp.



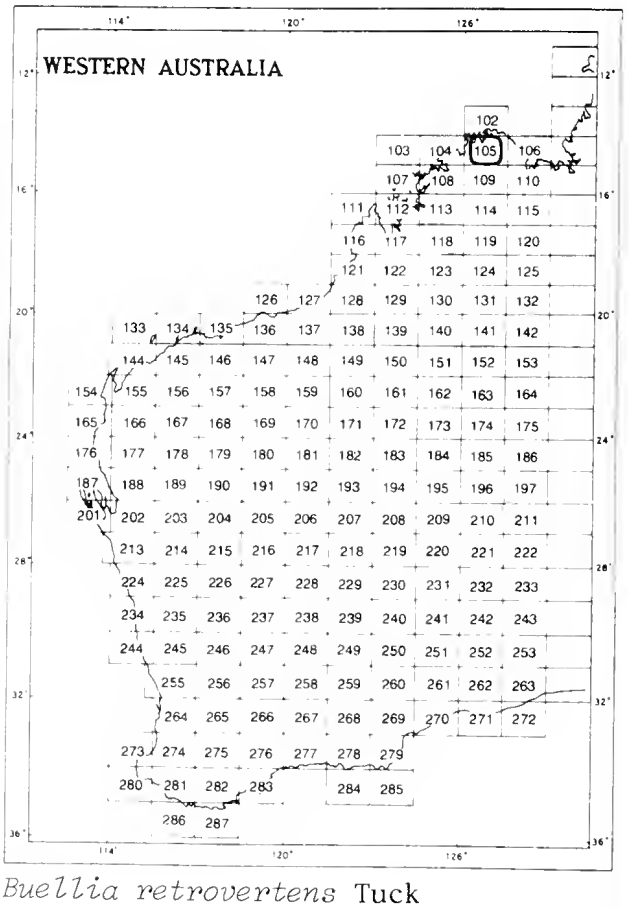
Buellia disciformis (Fr.) Mudd



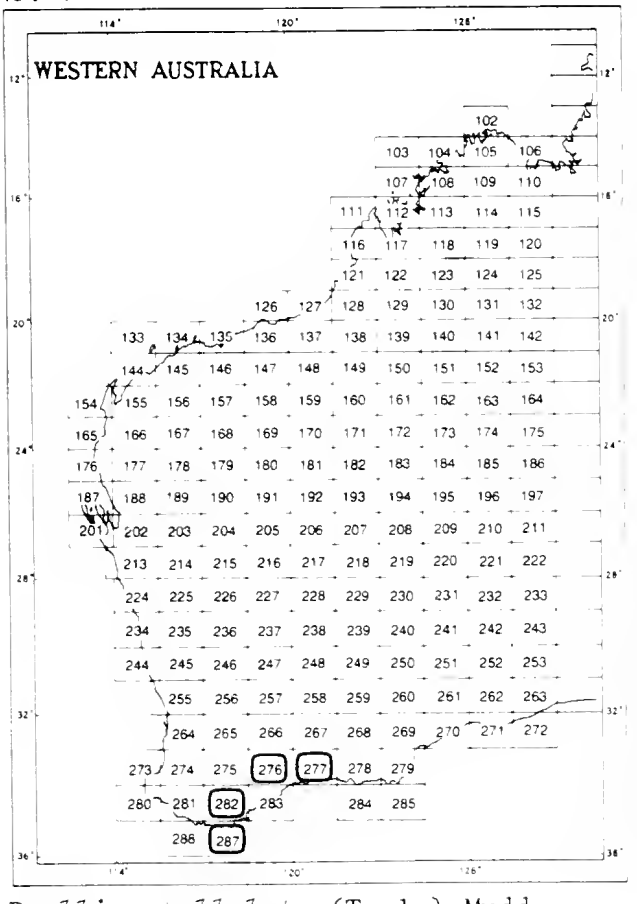
**Buellia glomerulans* (Muell. Arg.) Zahlbr.



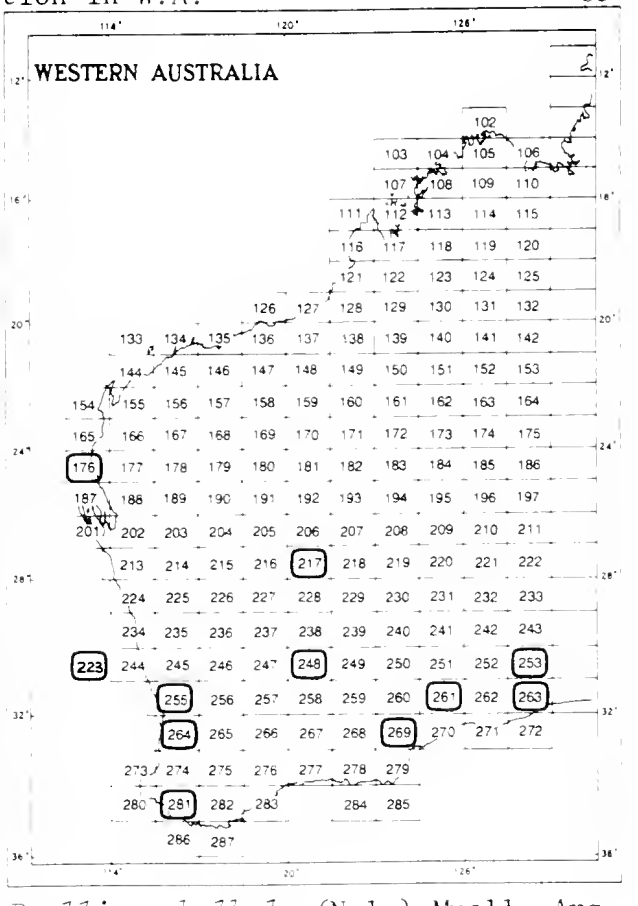
Buellia punctata (Hoffm.) Massal.



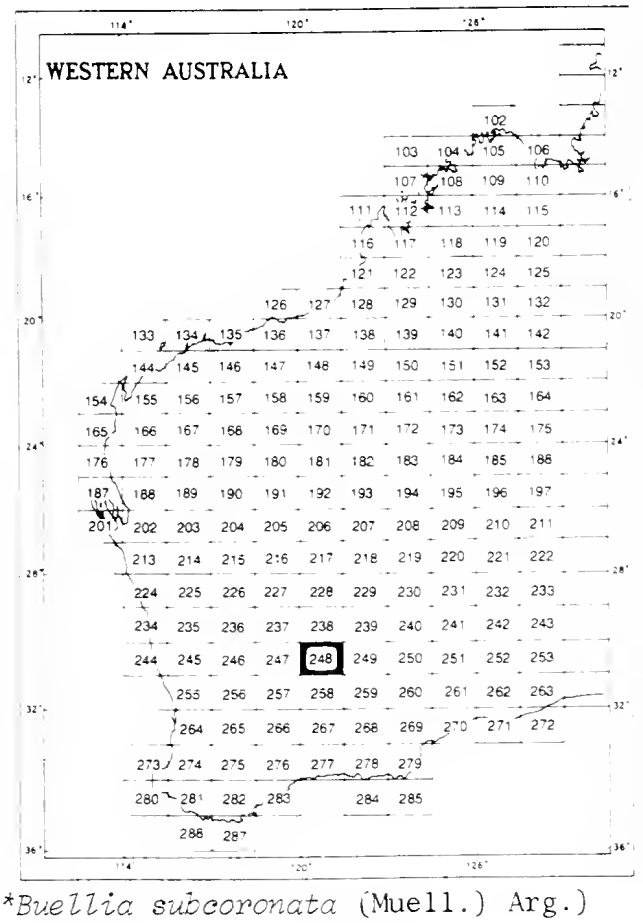
Buellia retrovertens Tuck



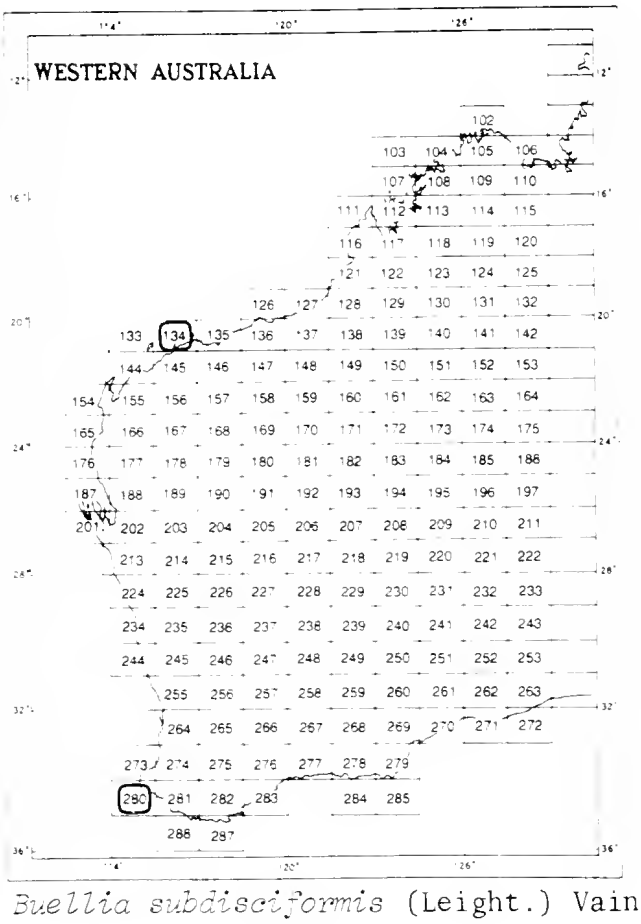
Buellia stellulata (Tayl.) Mudd



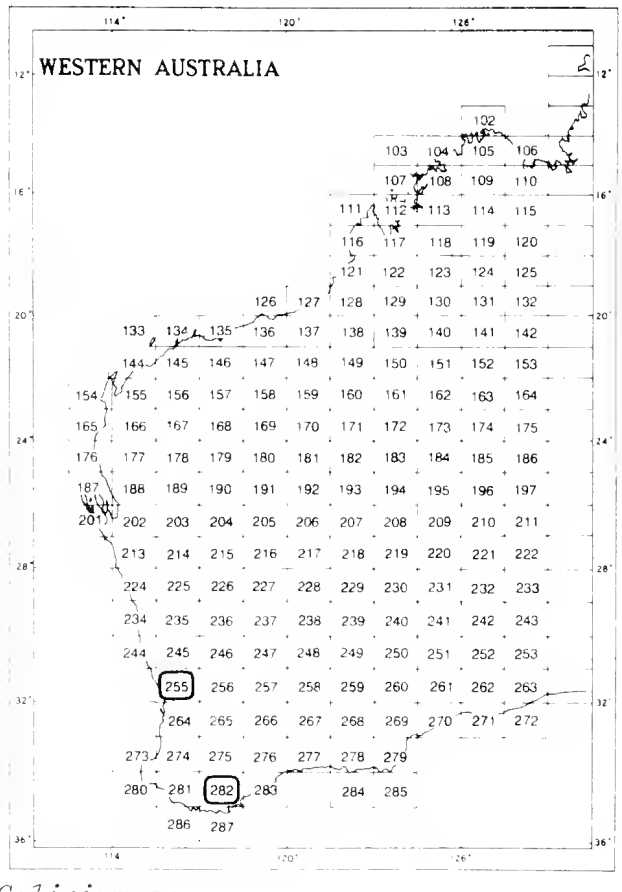
Buellia subalbula (Nyl.) Muell. Arg.



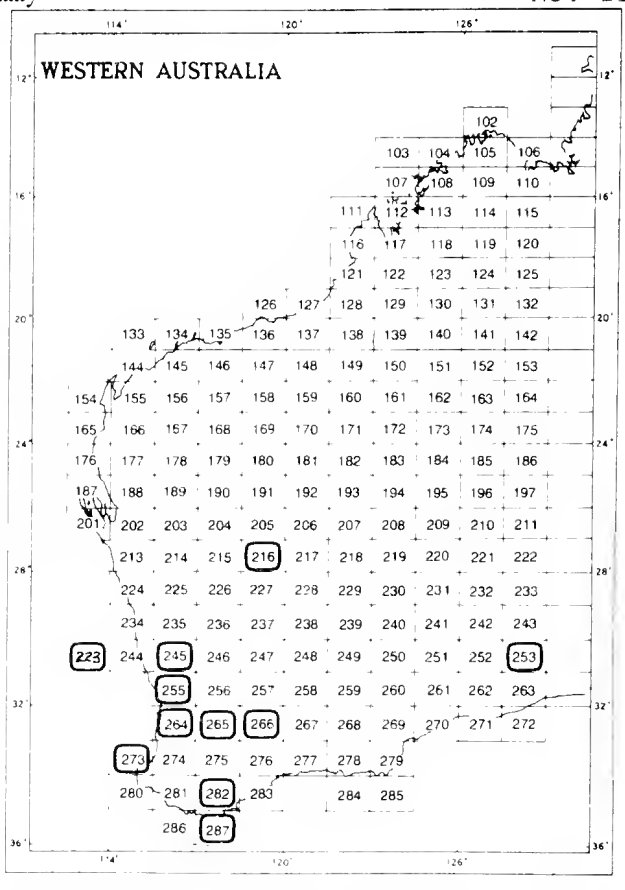
**Buellia subcoronata* (Muell.) Arg.) Malme



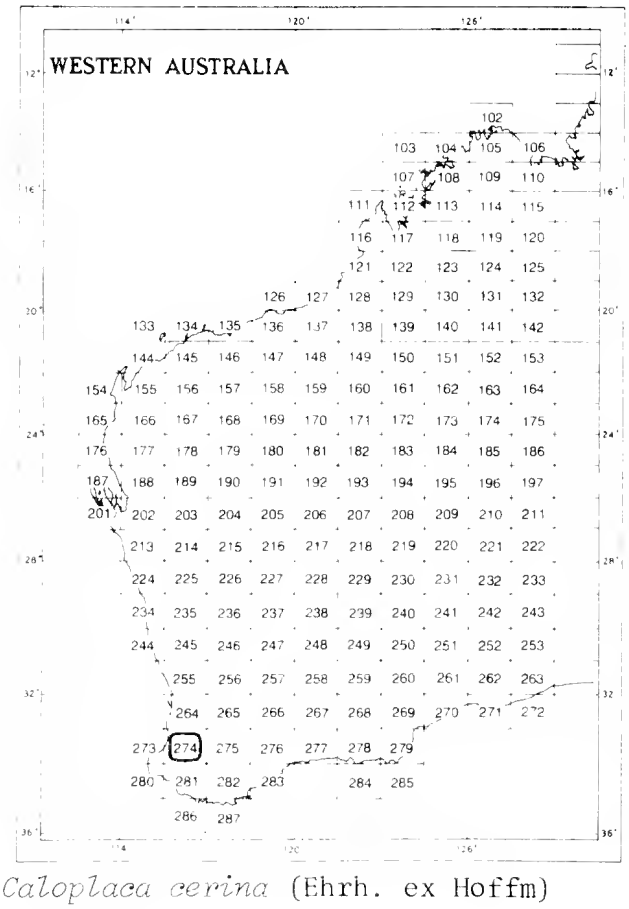
Buellia subdisciformis (Leight.) Vain.



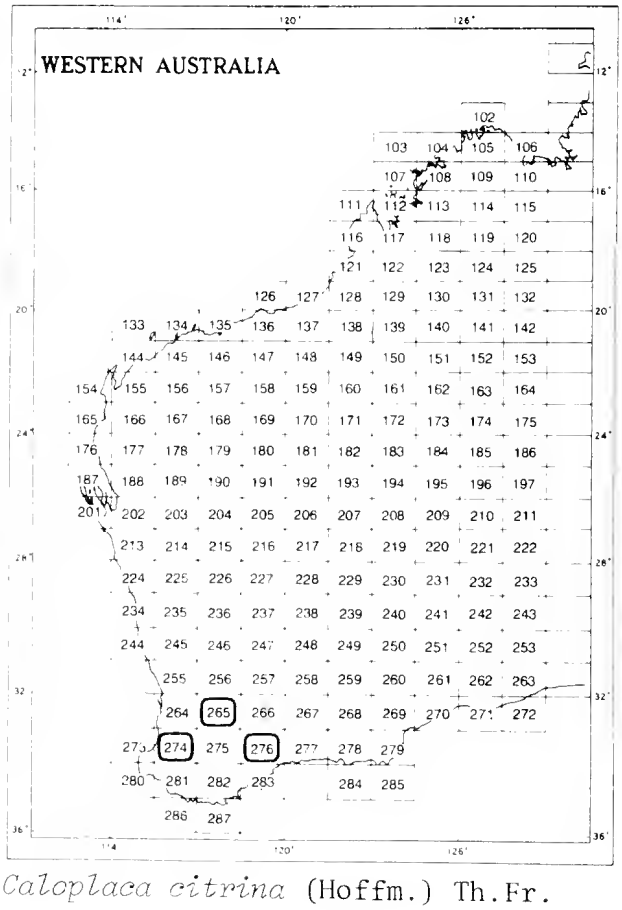
Calicium sp.



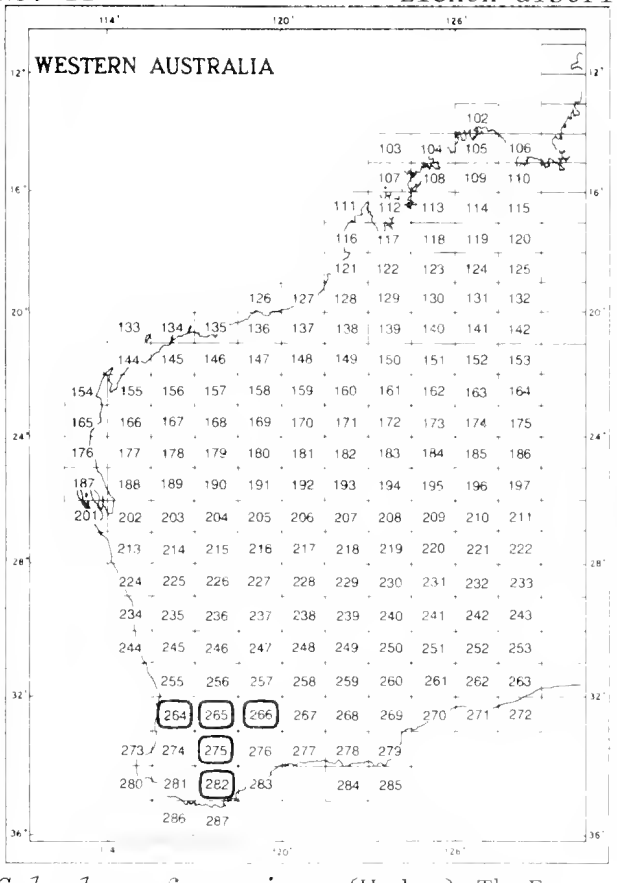
Caloplaca aurantiaca (Lightf.) Th.Fr.



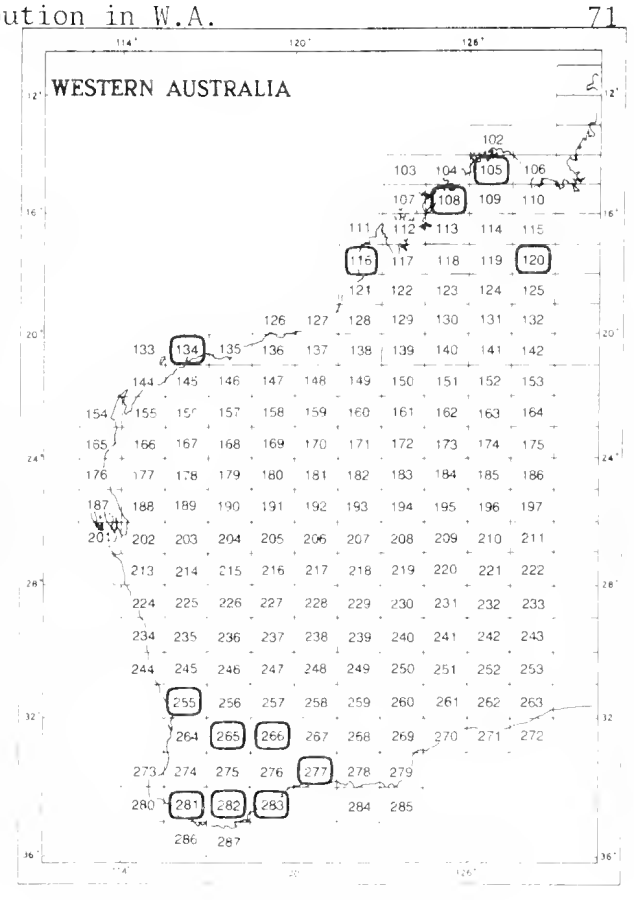
Caloplaca cerina (Ehrh. ex Hoffm) Th.Fr.



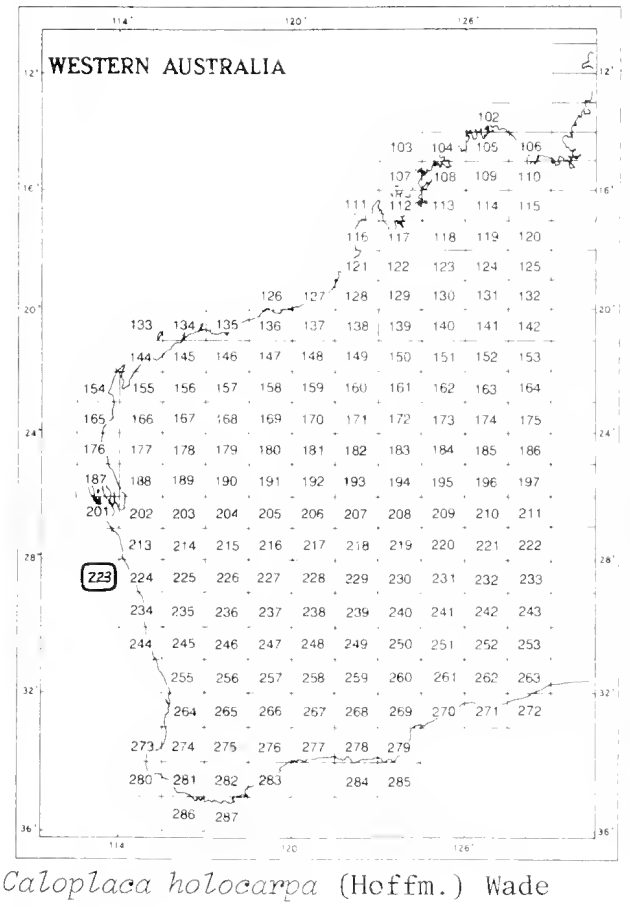
Caloplaca citrina (Hoffm.) Th.Fr.



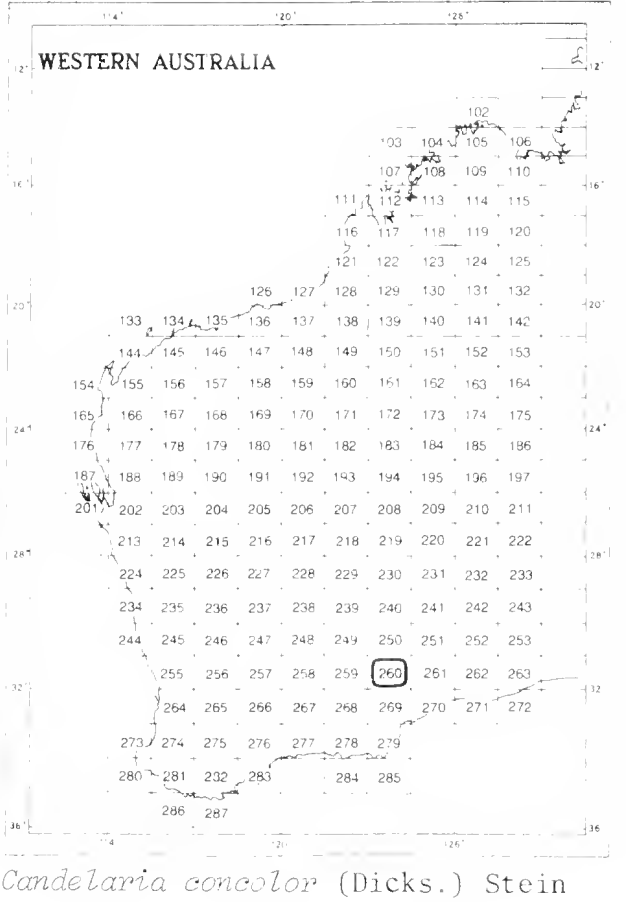
Caloplaca ferruginea (Huds.) Th.Fr.



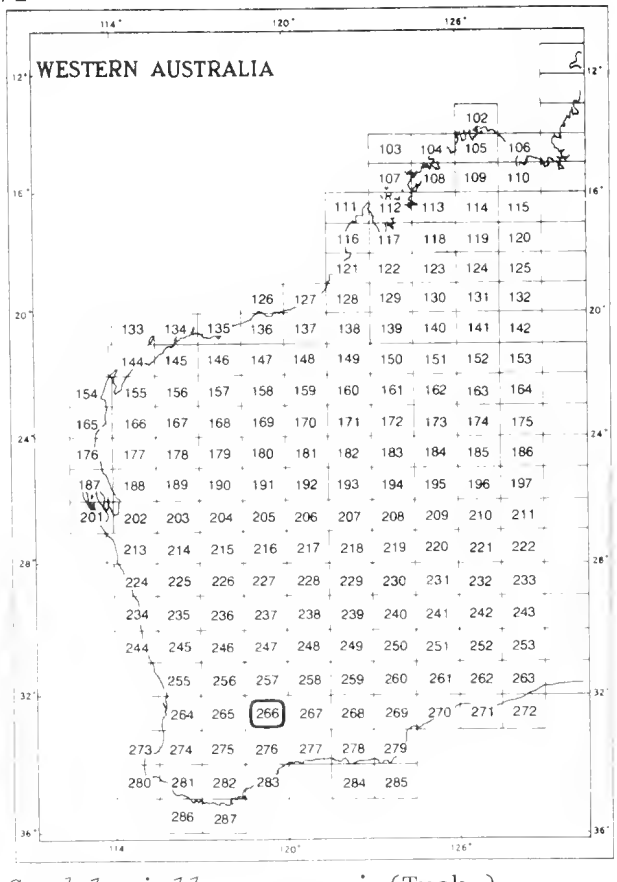
Caloplaca fulgens Koerb.



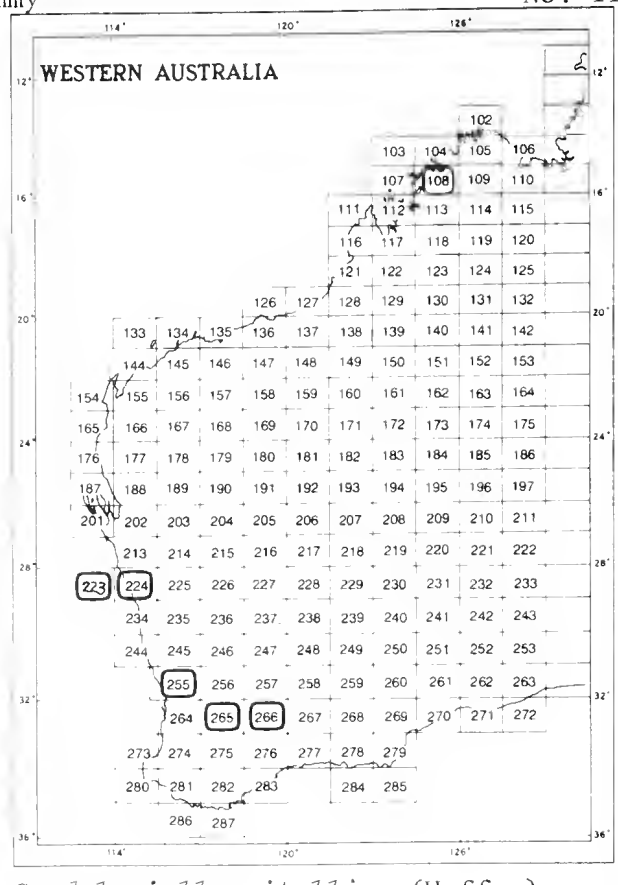
Caloplaca holocarpa (Hoffm.) Wade



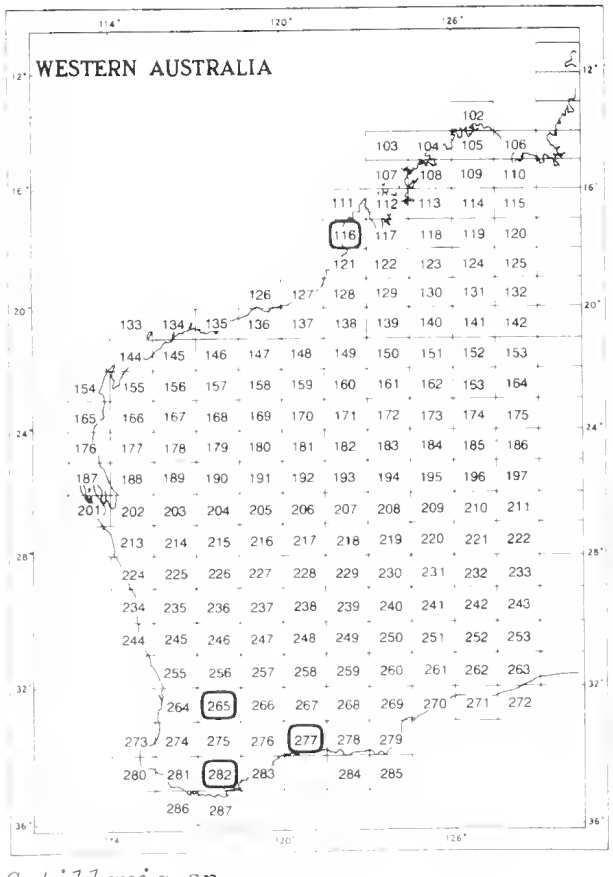
Candelaria concolor (Dicks.) Stein



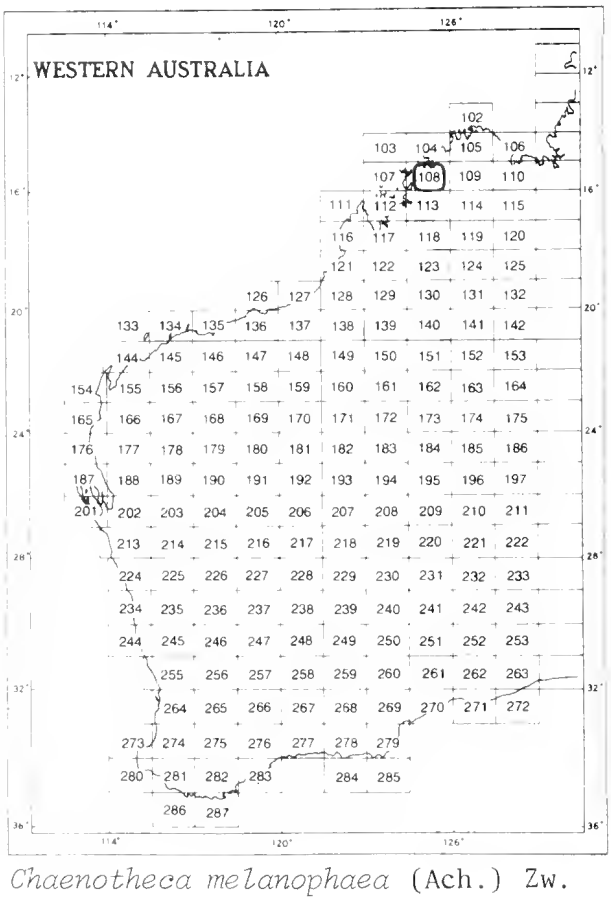
Candelariella spraguei (Tuck.) Zahlbr.



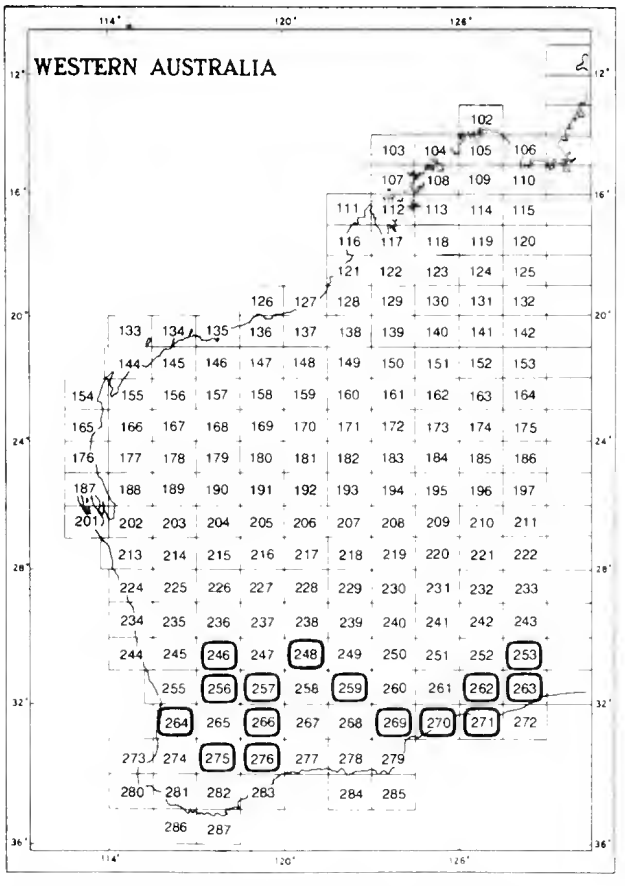
Candelariella vitellina (Hoffm.) Muell.Arg.



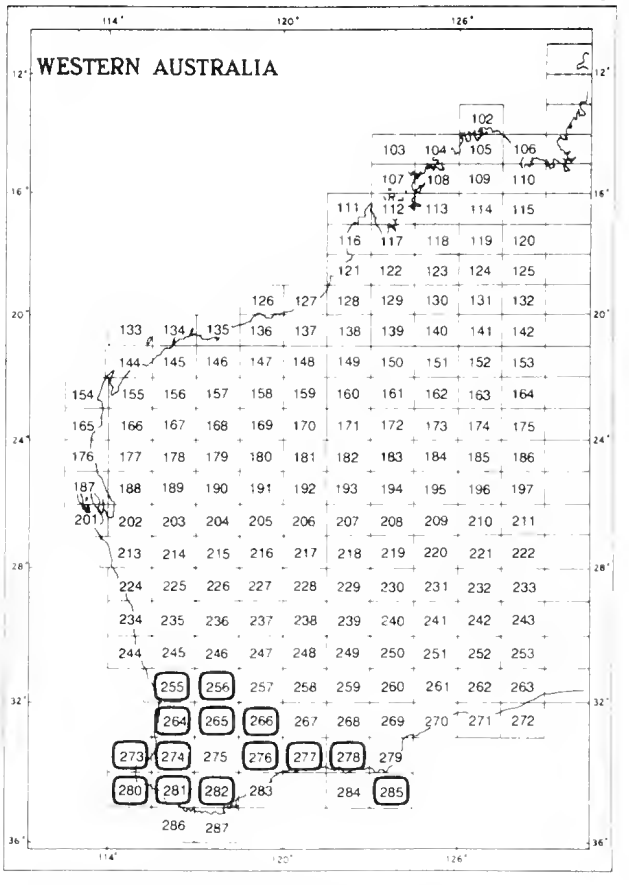
Catillaria sp.



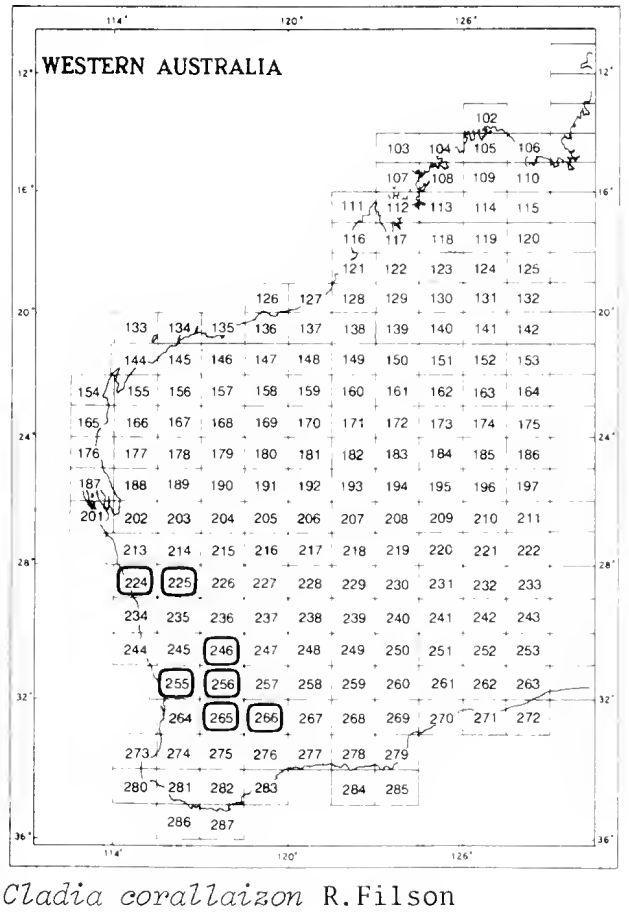
Chaenotheca melanophaea (Ach.) Zw.



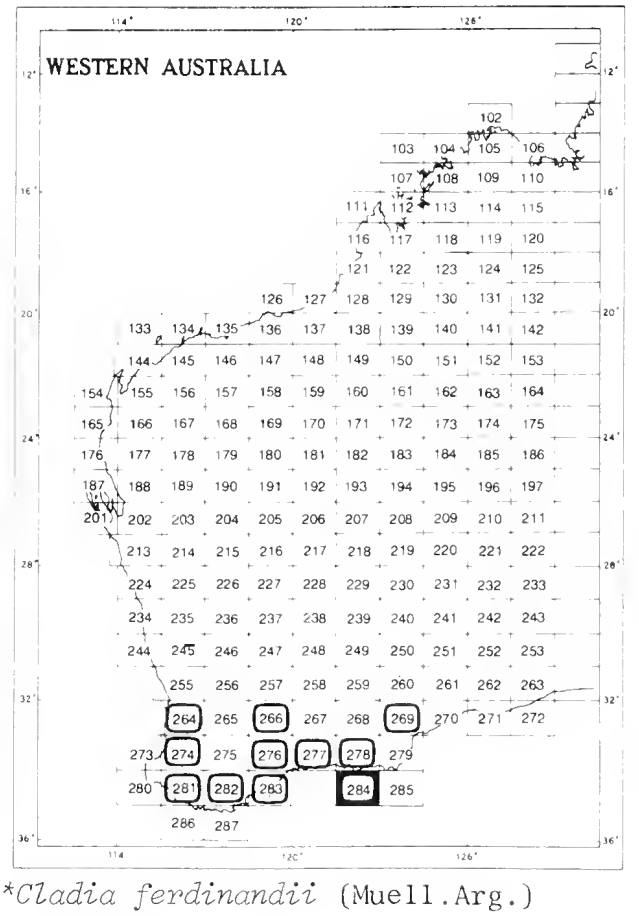
Chondropsis semiviridis (F.Muell. ex Nyl.) Nyl.



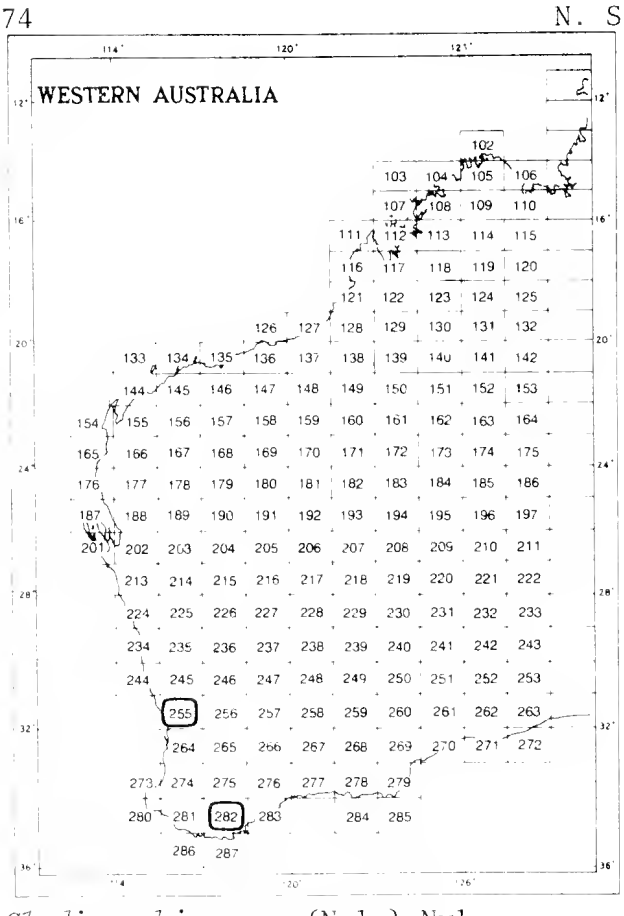
Cladia aggregata (Sw.) Nyl.



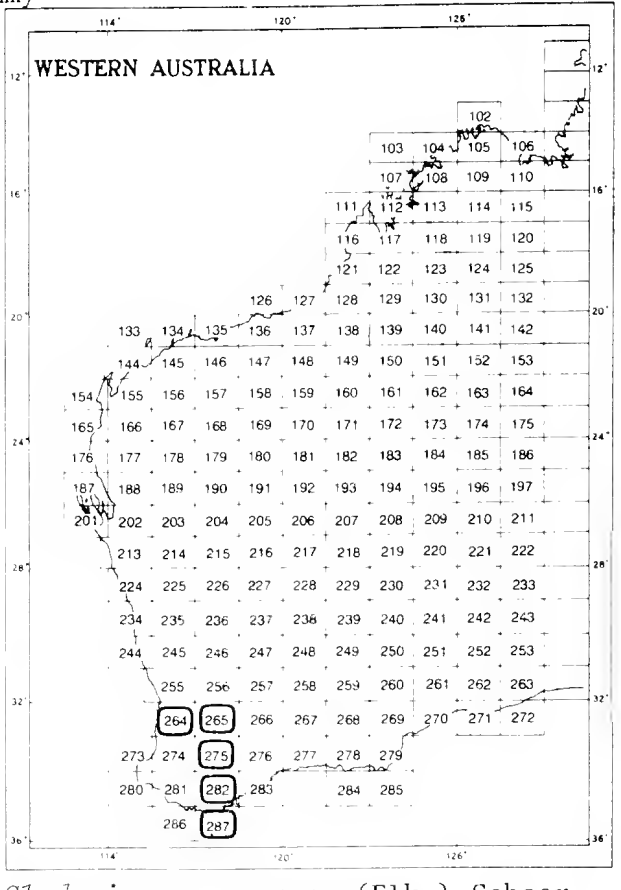
Cladia corallaizon R.Filson



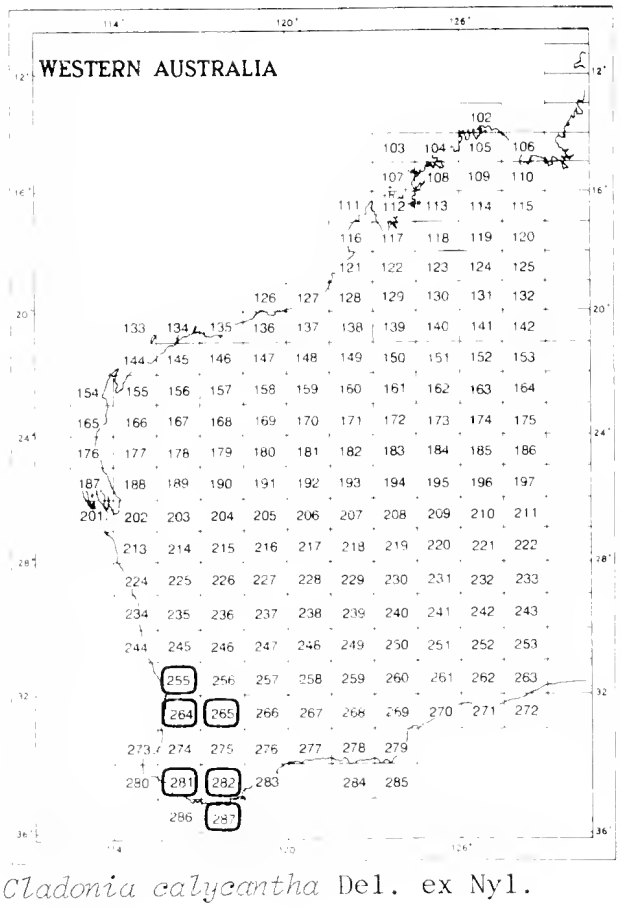
**Cladia ferdinandii* (Muell.Arg.) R.Filson



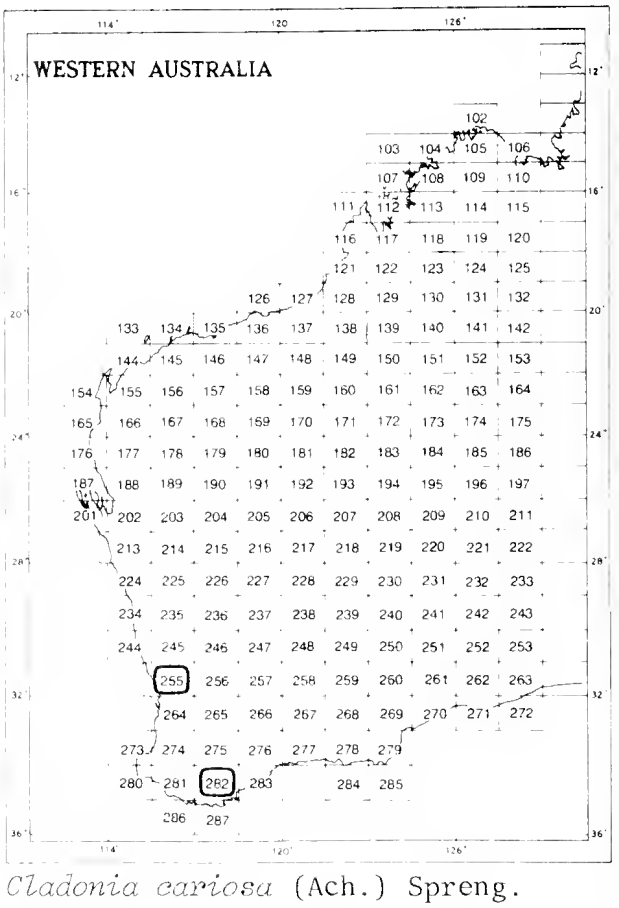
Cladia schizopora (Nyl.) Nyl.



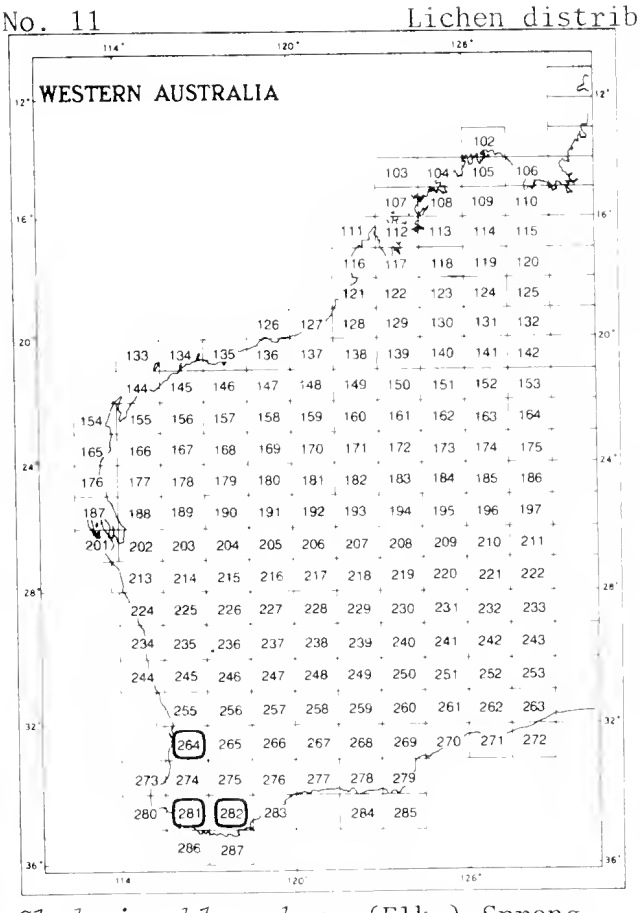
Cladonia amaurocraea (Flk.) Schaer.



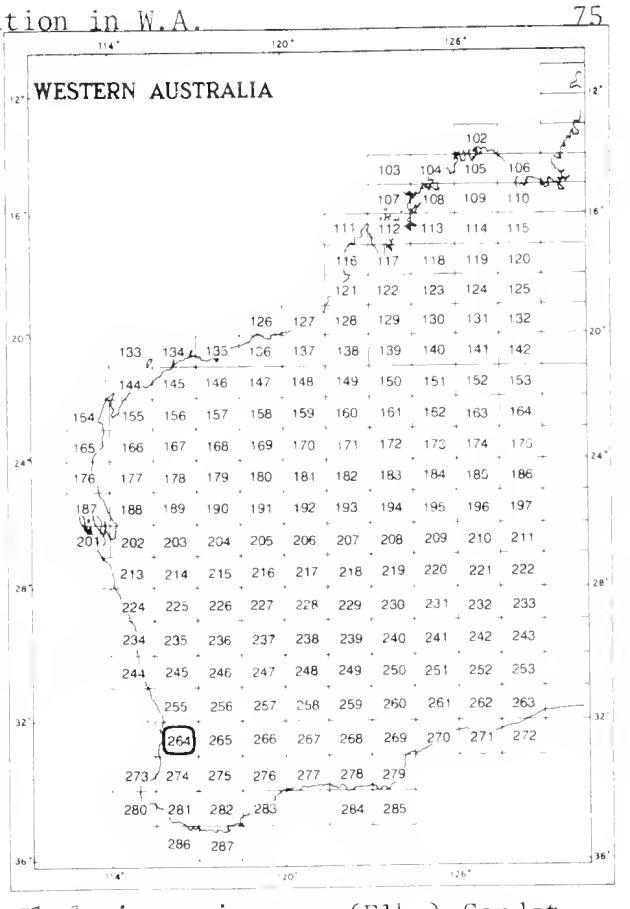
Cladonia calycantha Del. ex Nyl.



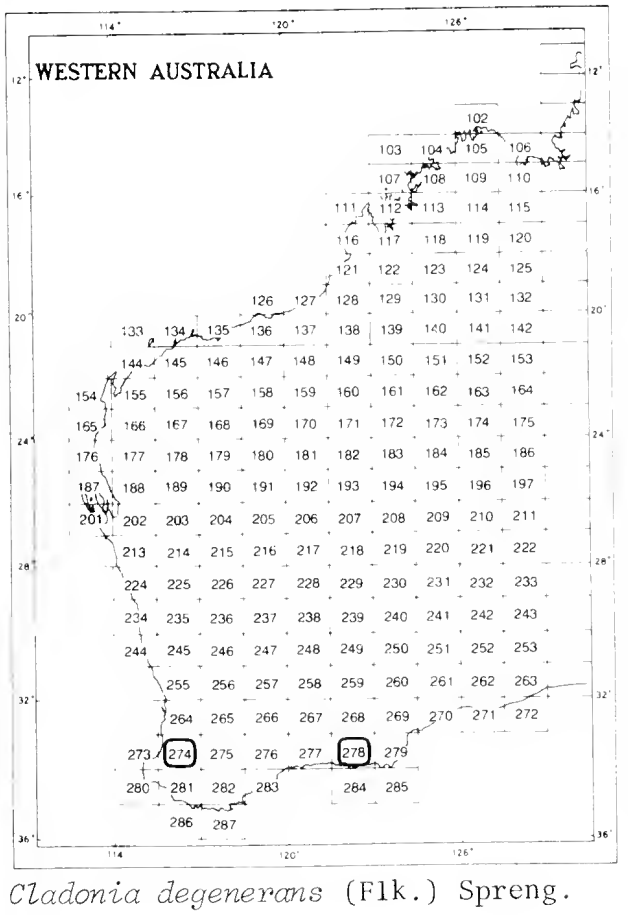
Cladonia cariosa (Ach.) Spreng.



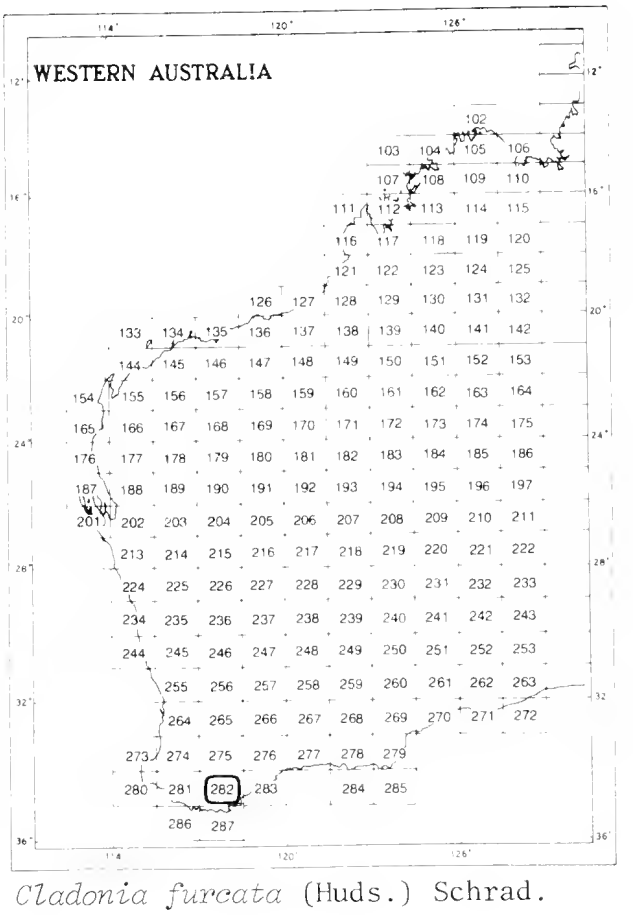
Cladonia chlorophaea (Flk.) Spreng.



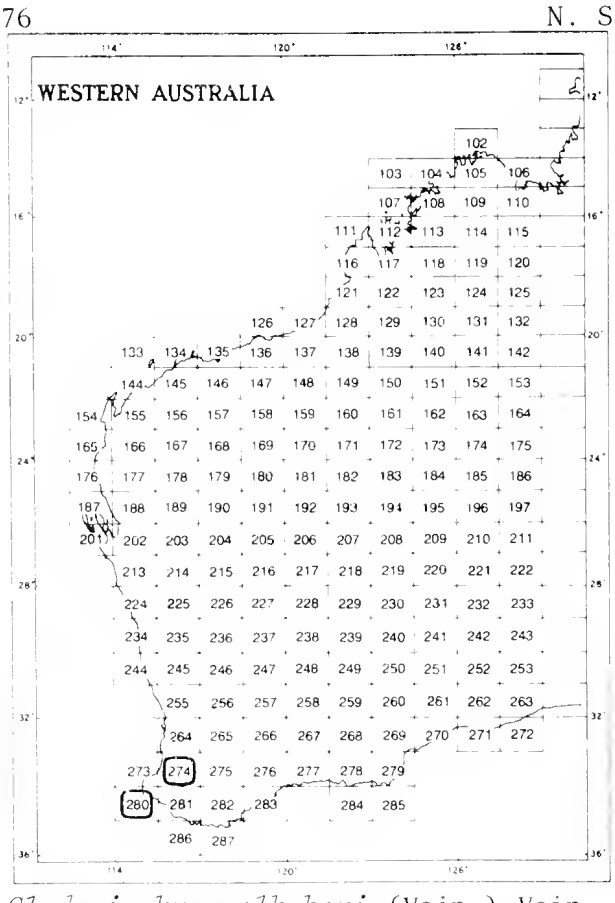
Cladonia coniocraea (Flk.) Sandst.



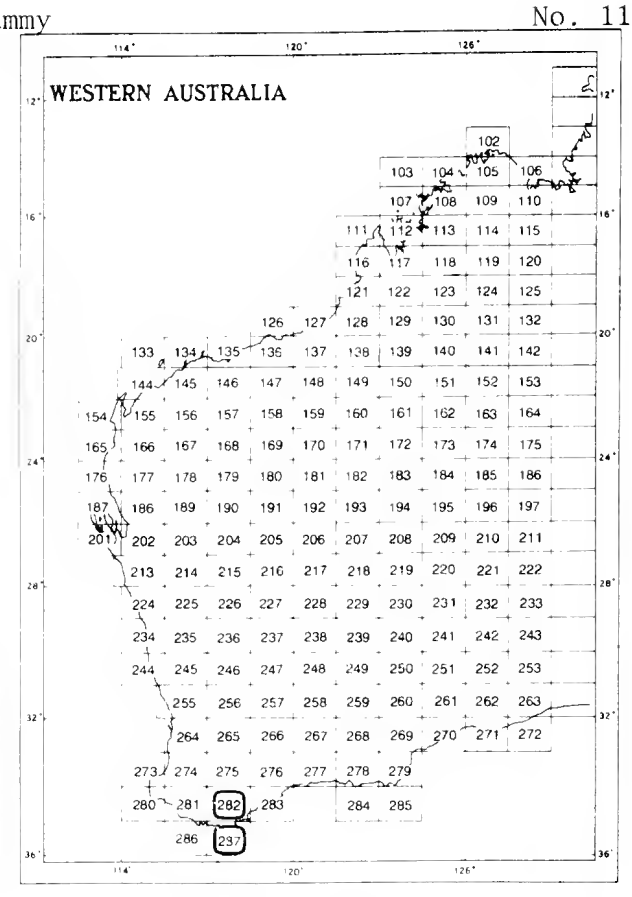
Cladonia degenerans (Flk.) Spreng.



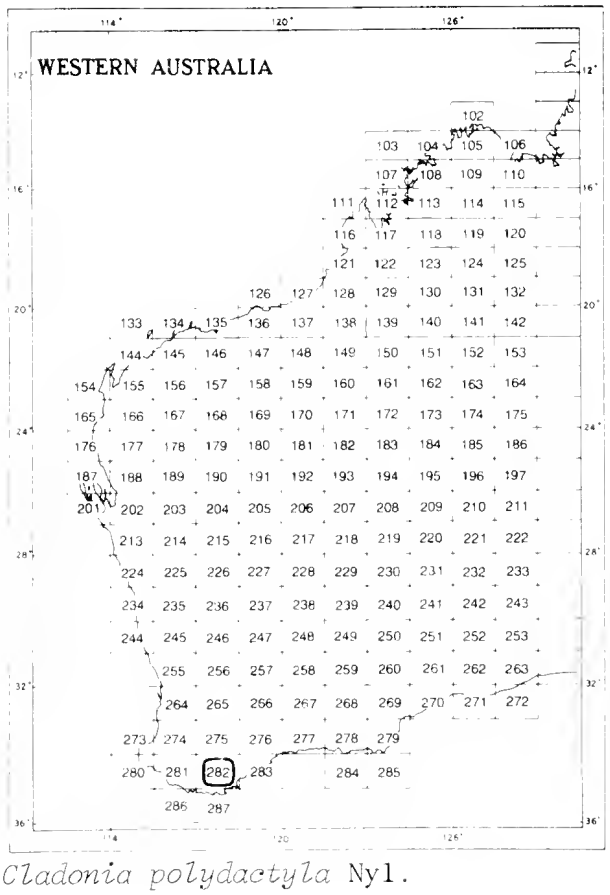
Cladonia furcata (Huds.) Schrad.



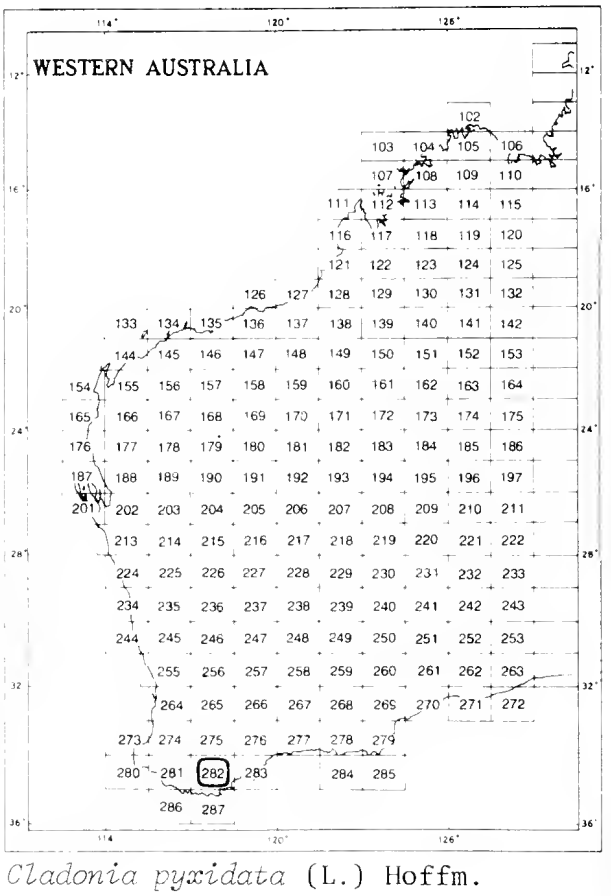
Cladonia krempelhuberi (Vain.) Vain.



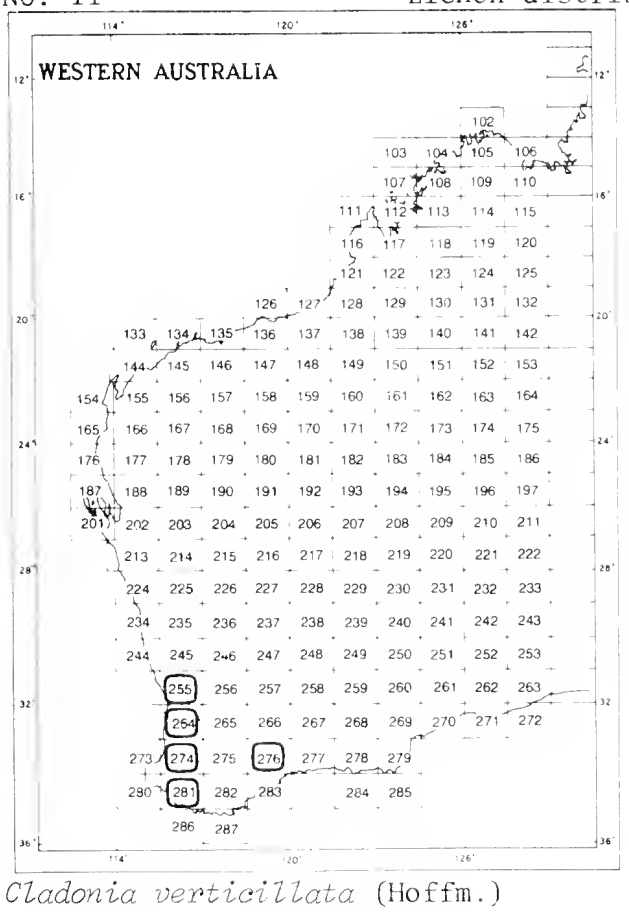
Cladonia pityrea (Flk.) Fr.



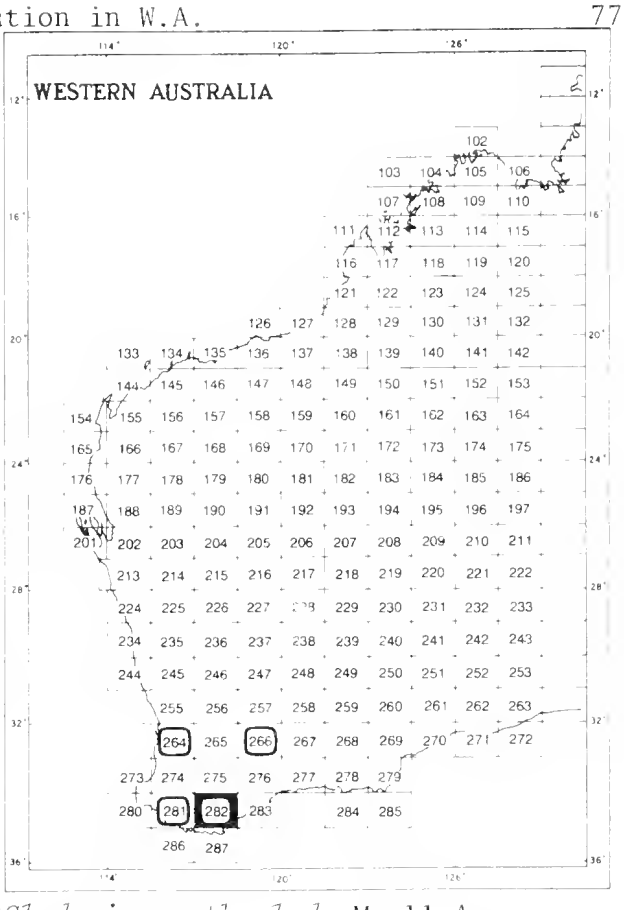
Cladonia polydactyla Nyl.



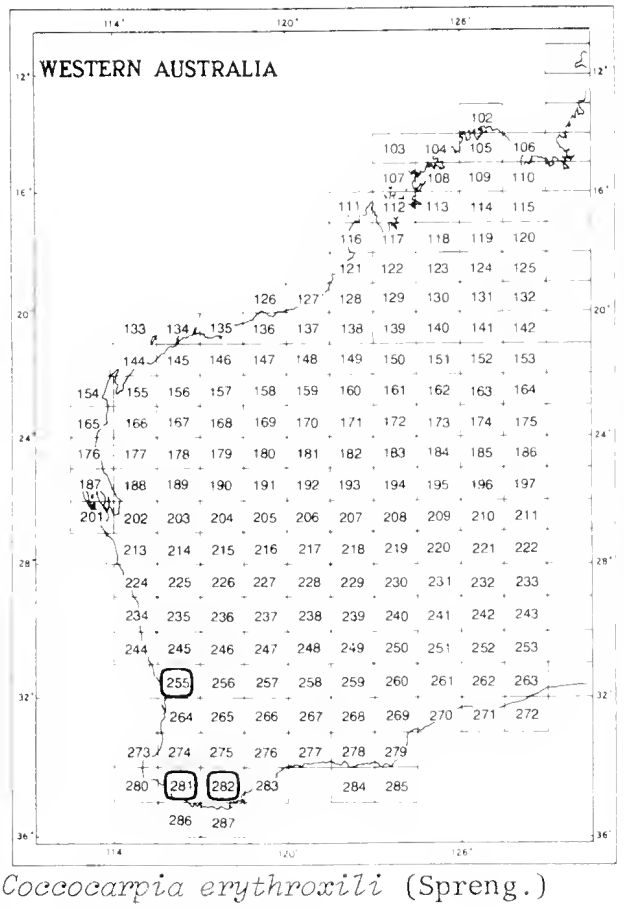
Cladonia pyxidata (L.) Hoffm.



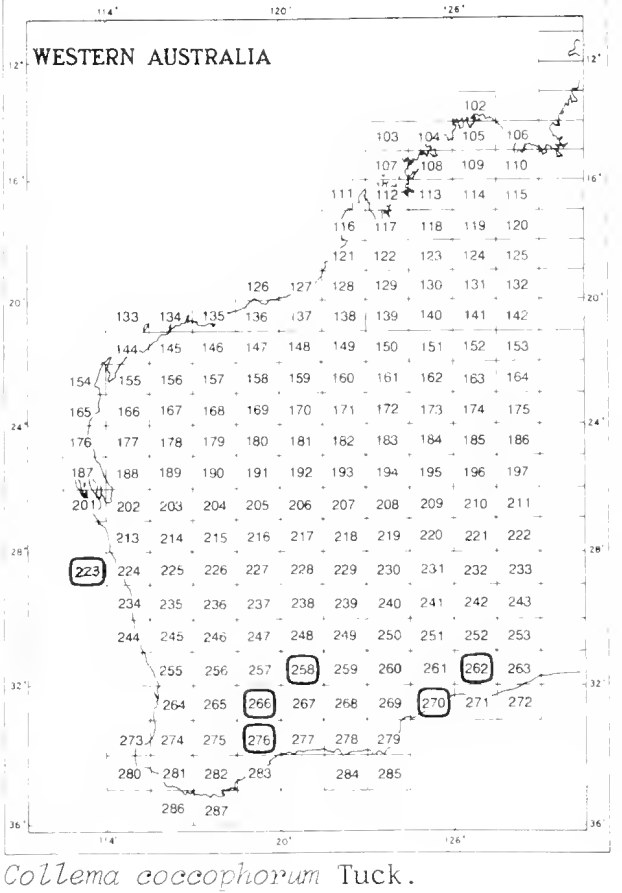
Cladonia verticillata (Hoffm.) Schaer.



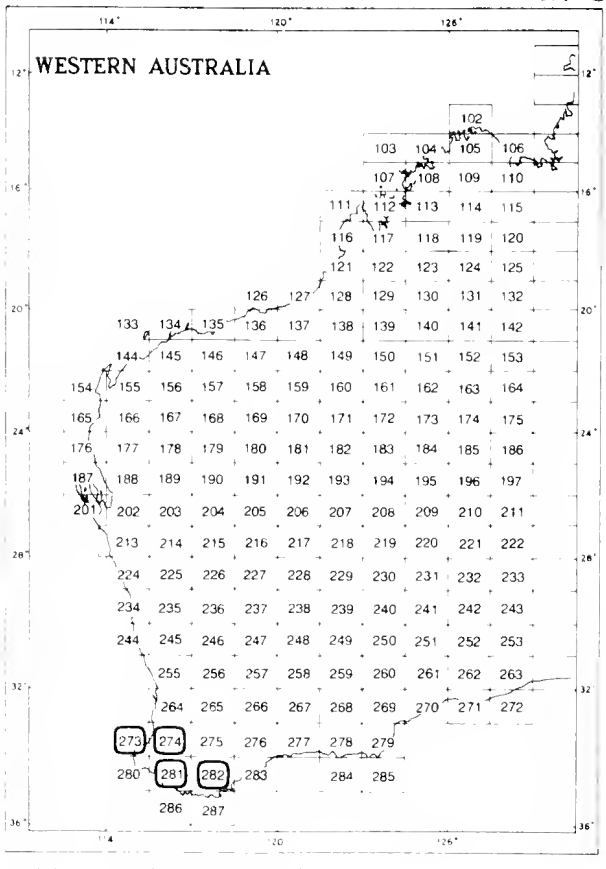
**Cladonia xanthoclada* Muell.Arg.



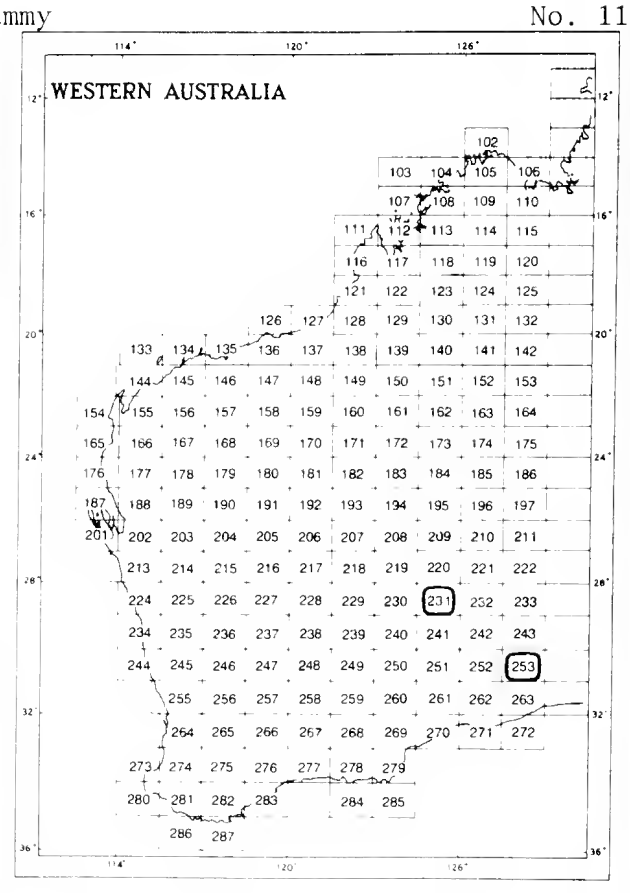
Coccocarpia erythroxili (Spreng.) Swinscow & Krog



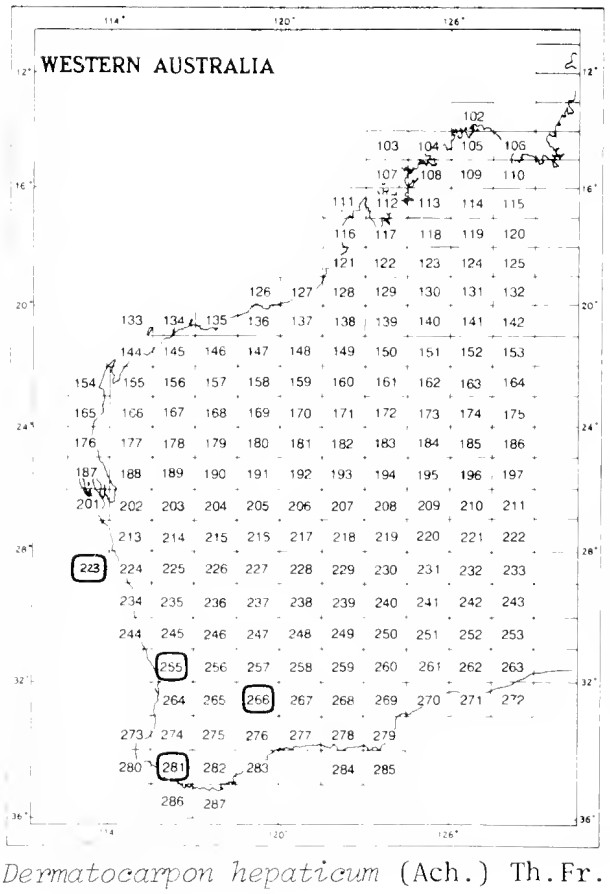
Collema coccophorum Tuck.



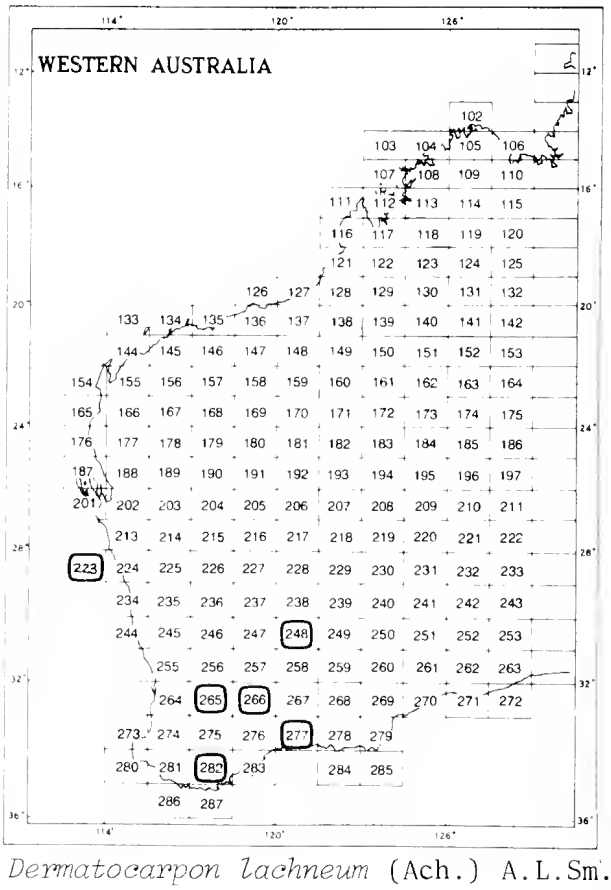
Collema glaucopthalmum Nyl.



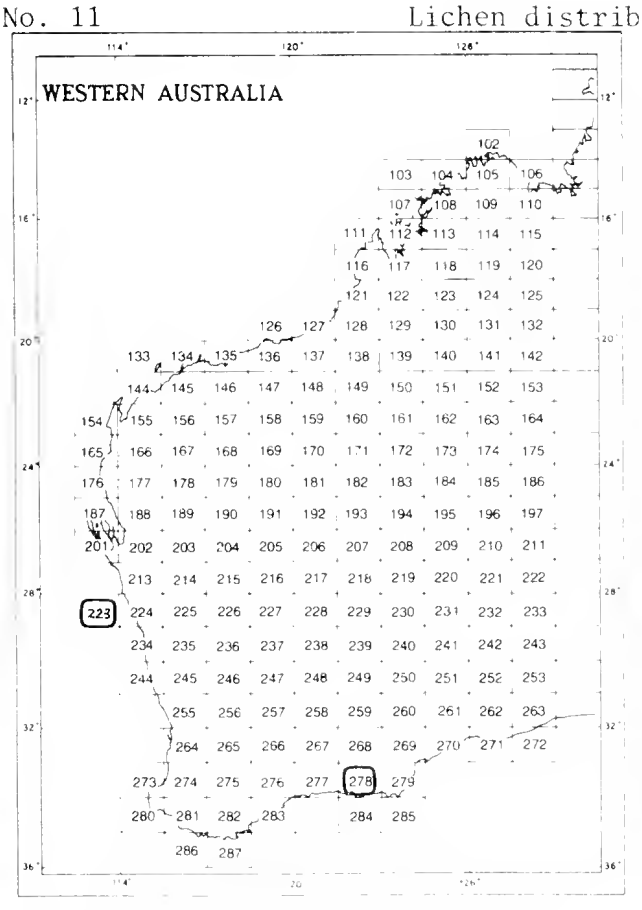
Dermatocarpon compactum (Mass.) Lettau.



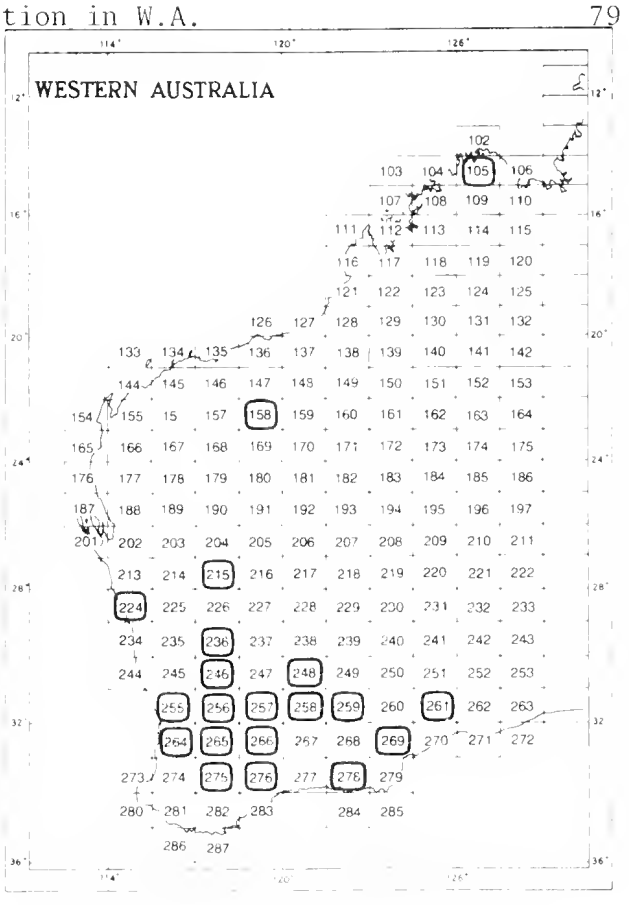
Dermatocarpon hepaticum (Ach.) Th.Fr.



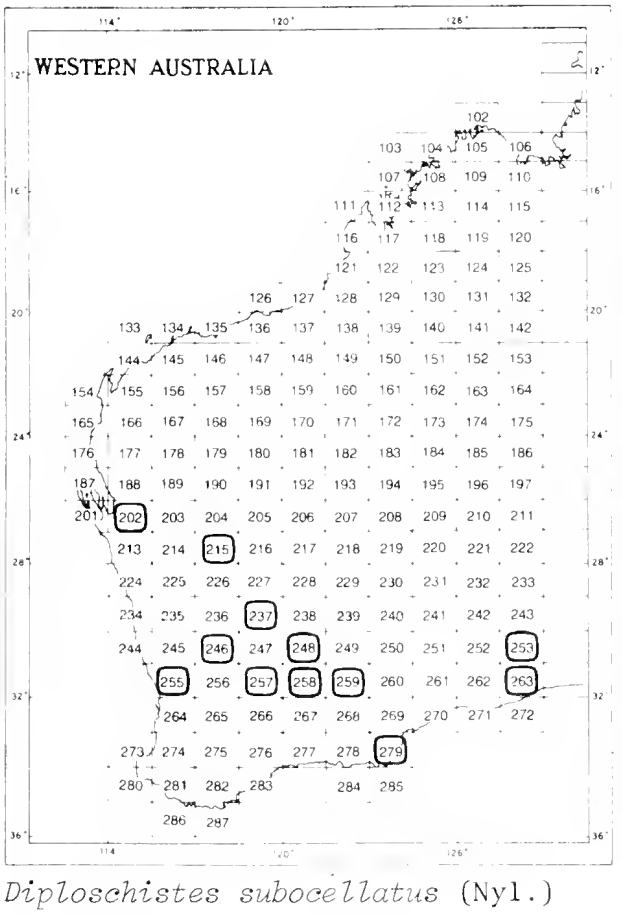
Dermatocarpon lachneum (Ach.) A.L.Sm.



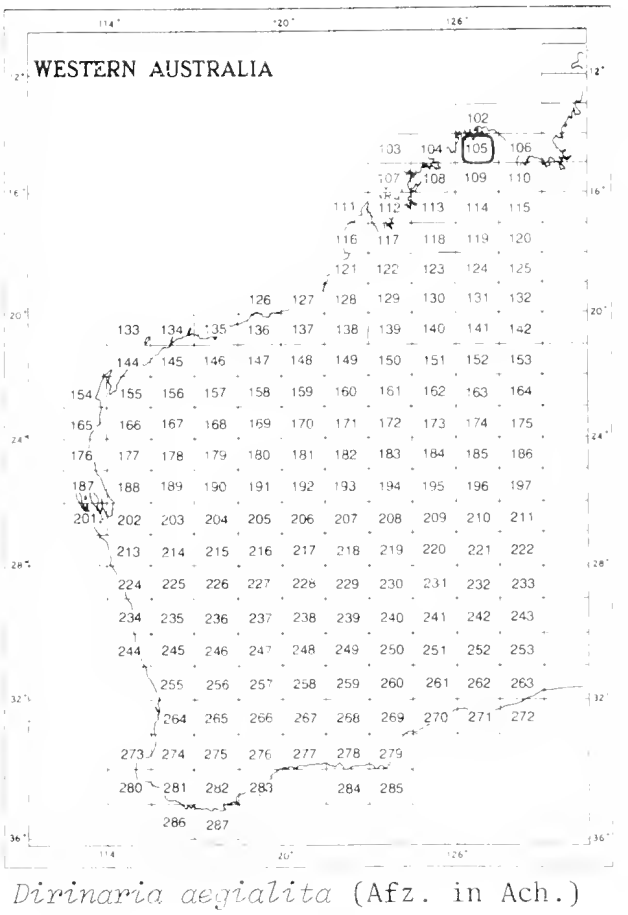
Diploicia canescens (Dicks.) Mass.



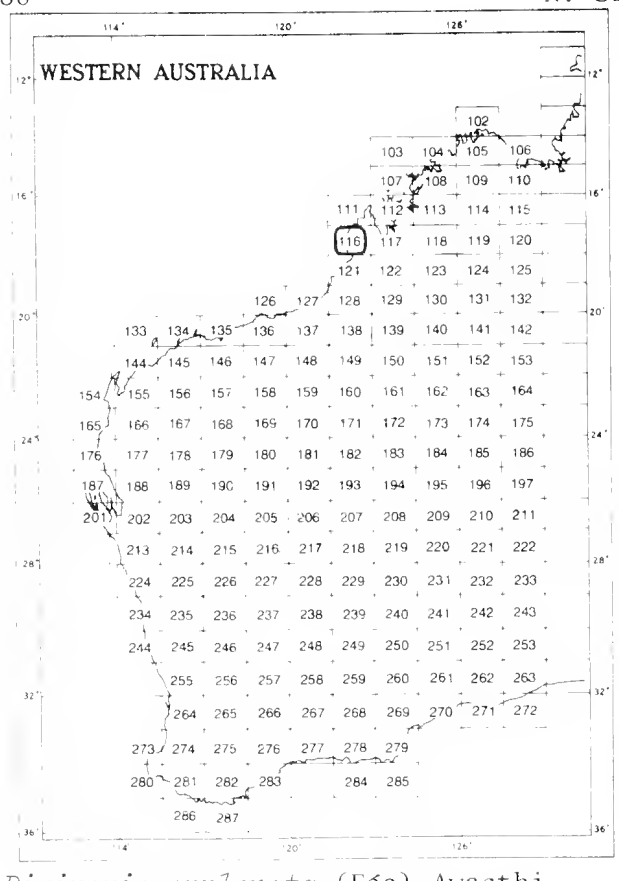
Diploschistes scruposus (Schreb.) Norm.



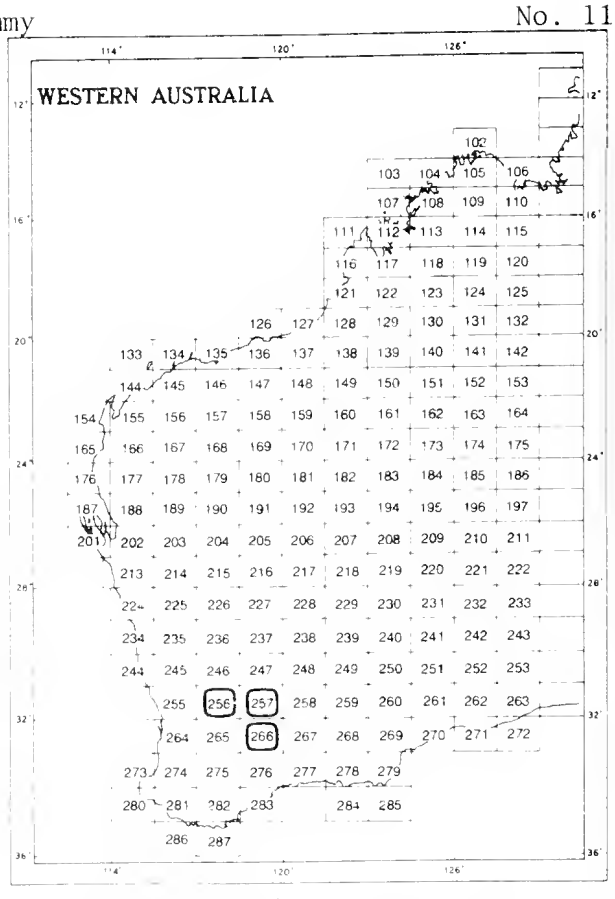
Diploschistes subocellatus (Nyl.) Zahlbr.



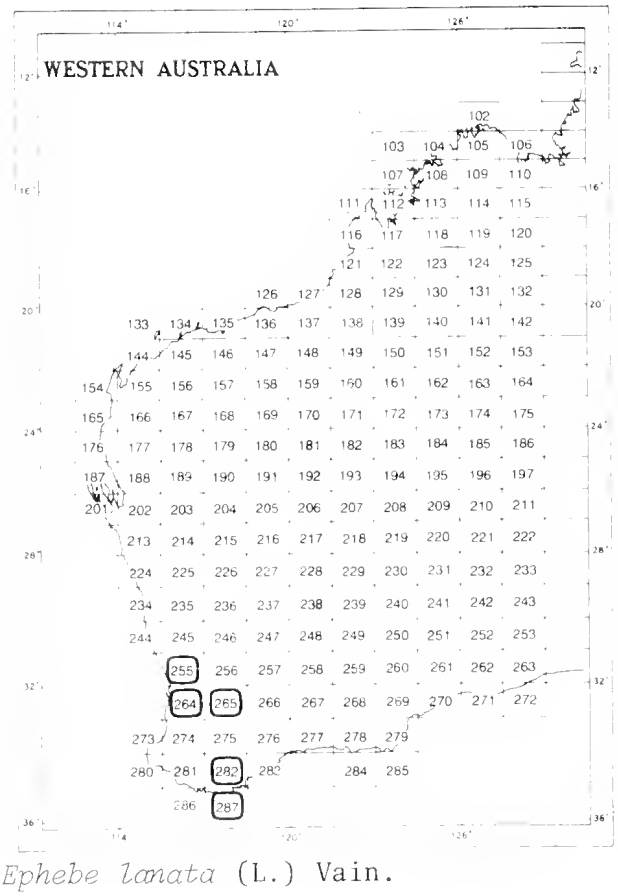
Dirinaria aegialita (Afz. in Ach.) Moore



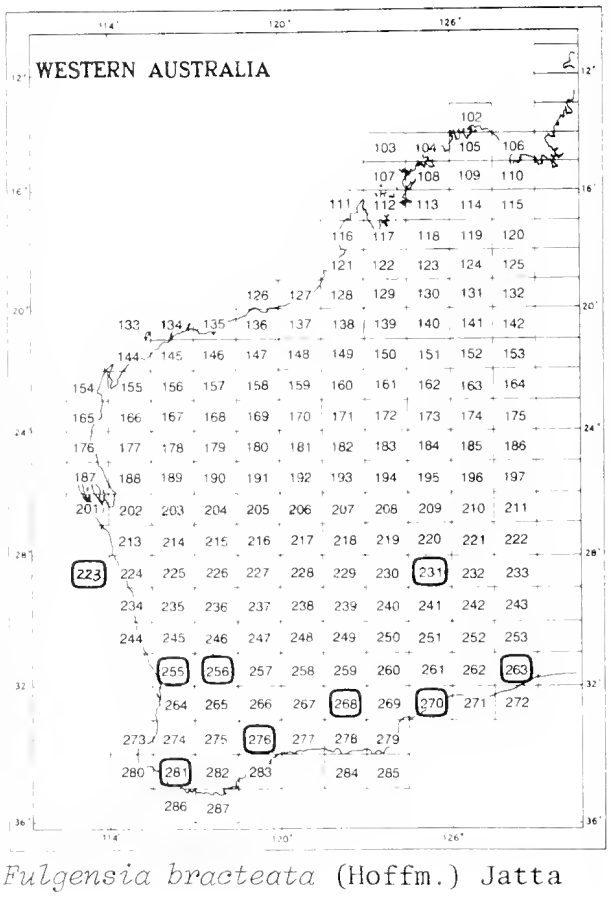
Dirinaria applanata (Fée) Awasthi



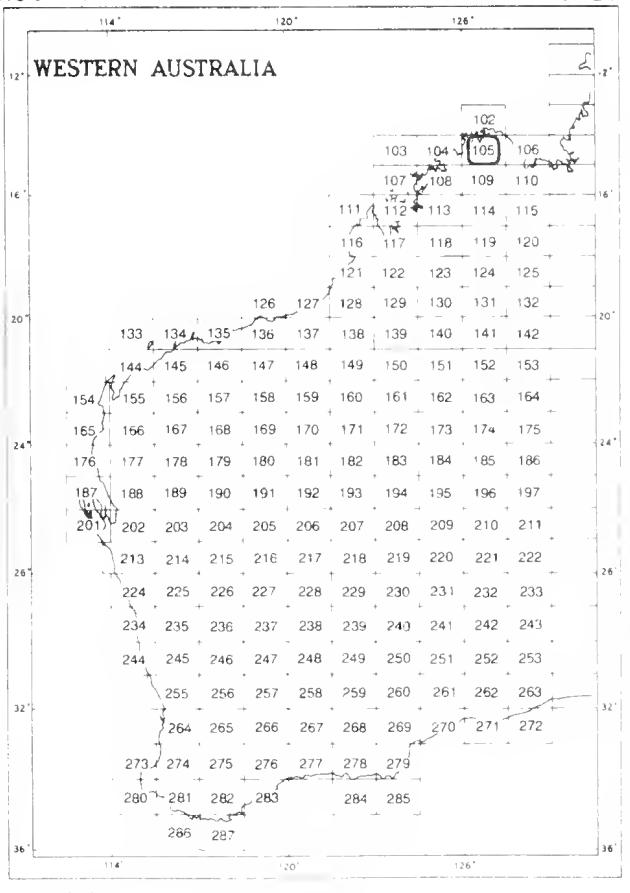
Endocarpon helmsianum Muell.Arg.



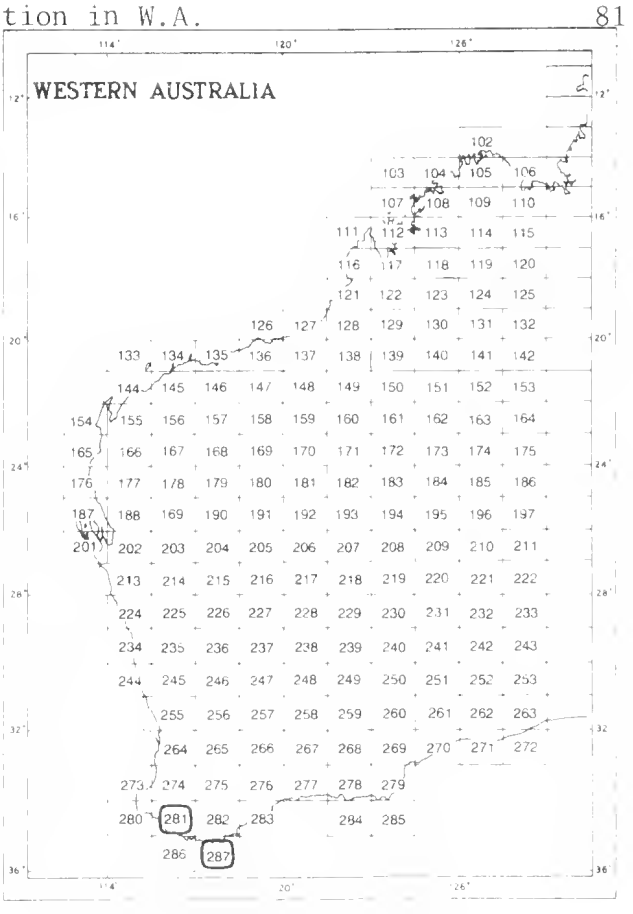
Ephebe lanata (L.) Vain.



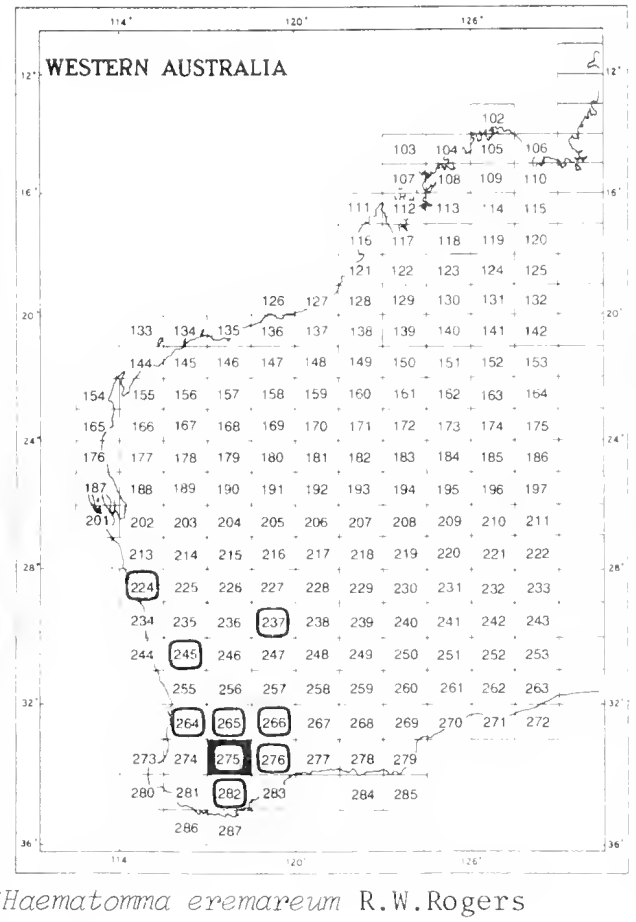
Fulgensia bracteata (Hoffm.) Jatta



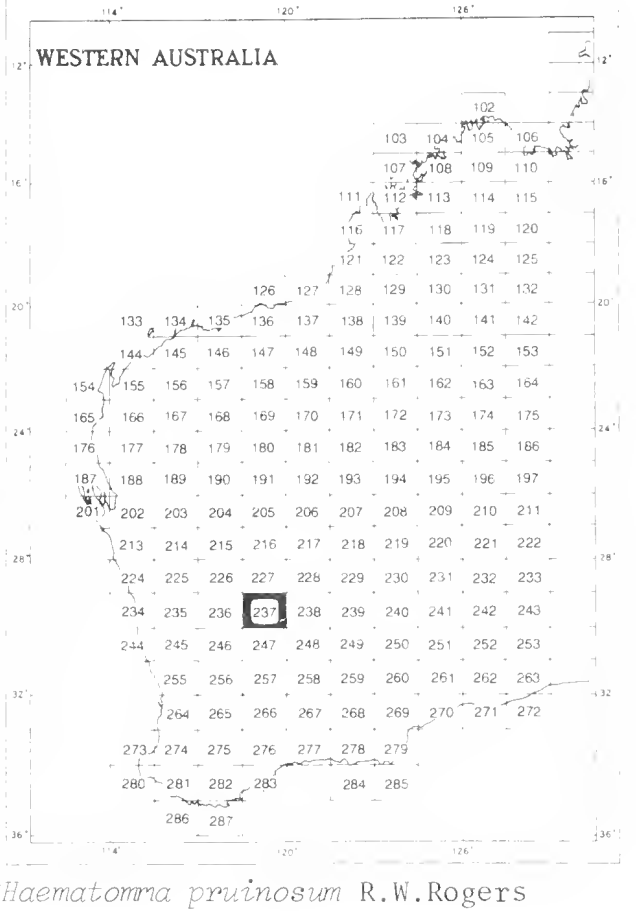
Graphis afzelii (Fée) Ach.



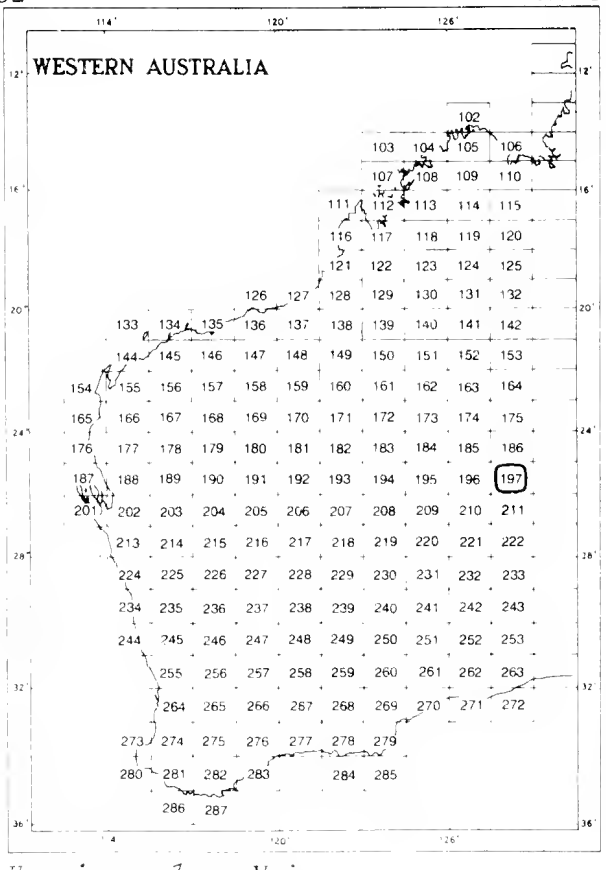
Graphis scripta (L.) Ach.



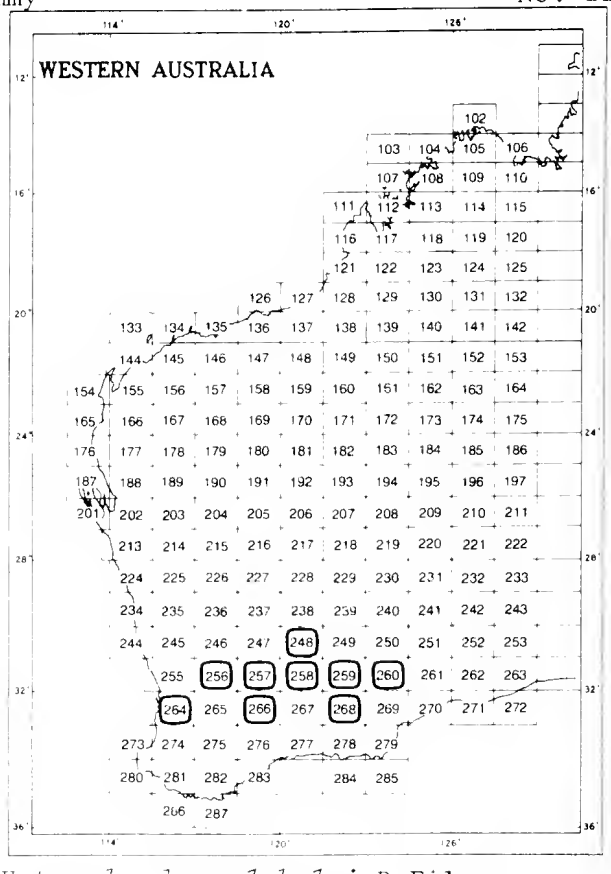
**Haematomma eremareum* R.W.Rogers



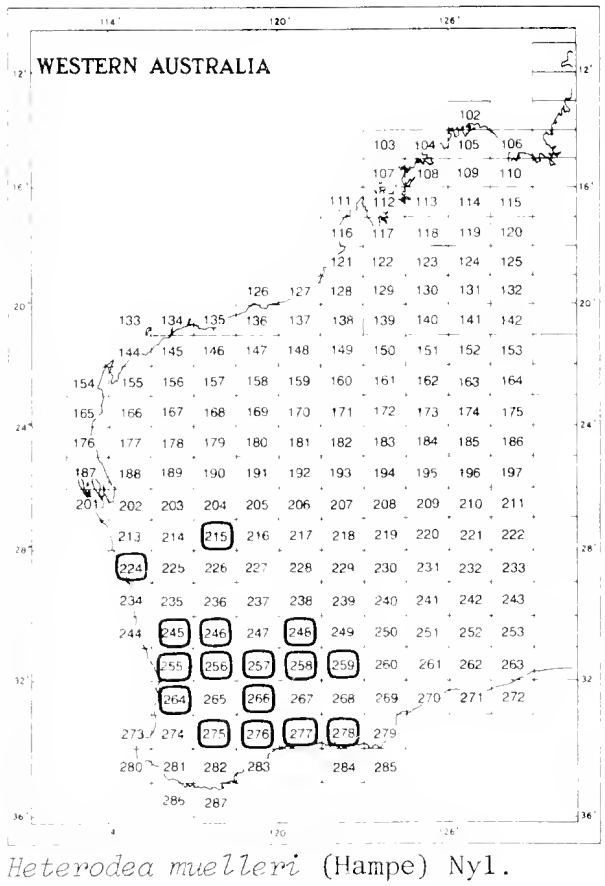
**Haematomma pruinosum* R.W.Rogers



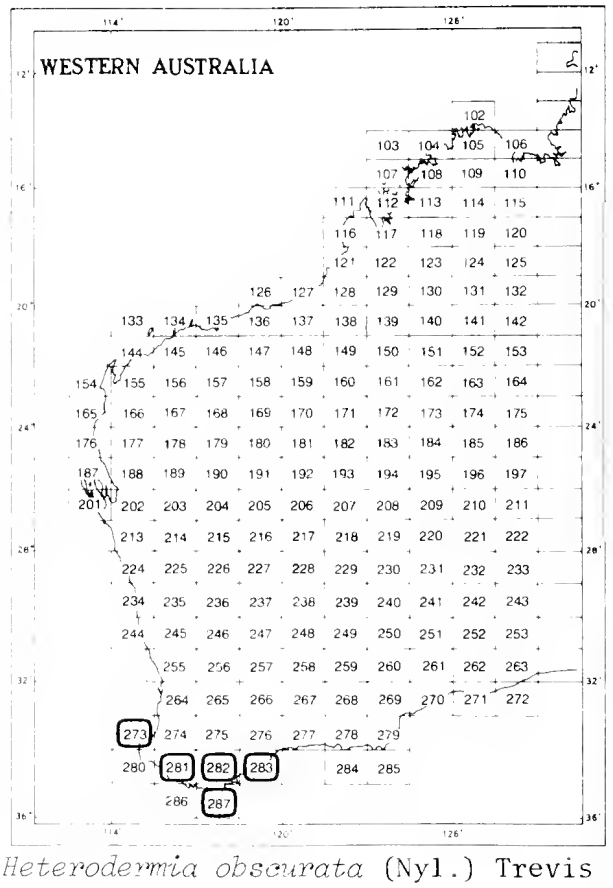
Heppia euploca Vain.



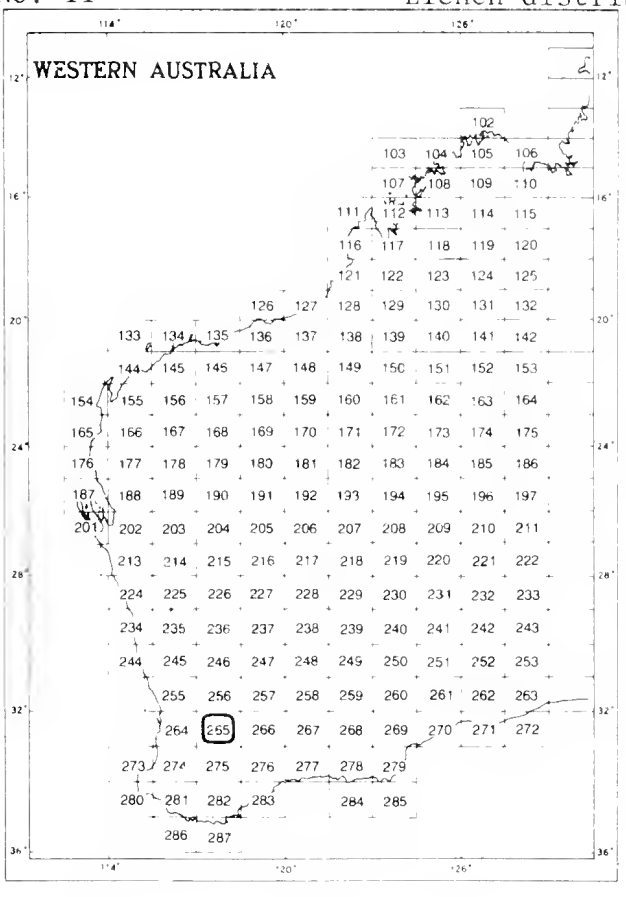
Heterodea beaugleholei R.Filson



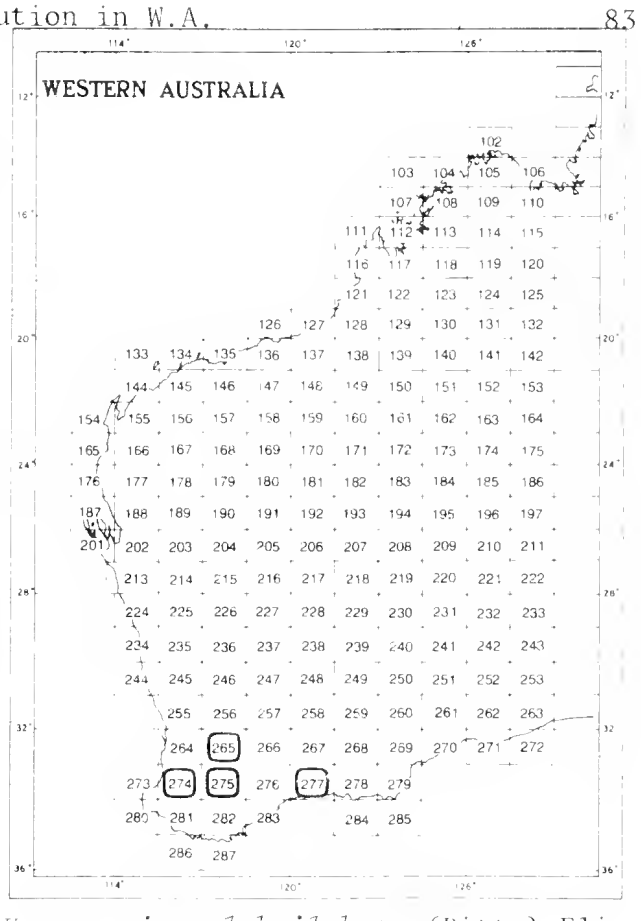
Heterodea muelleri (Hampe) Nyl.



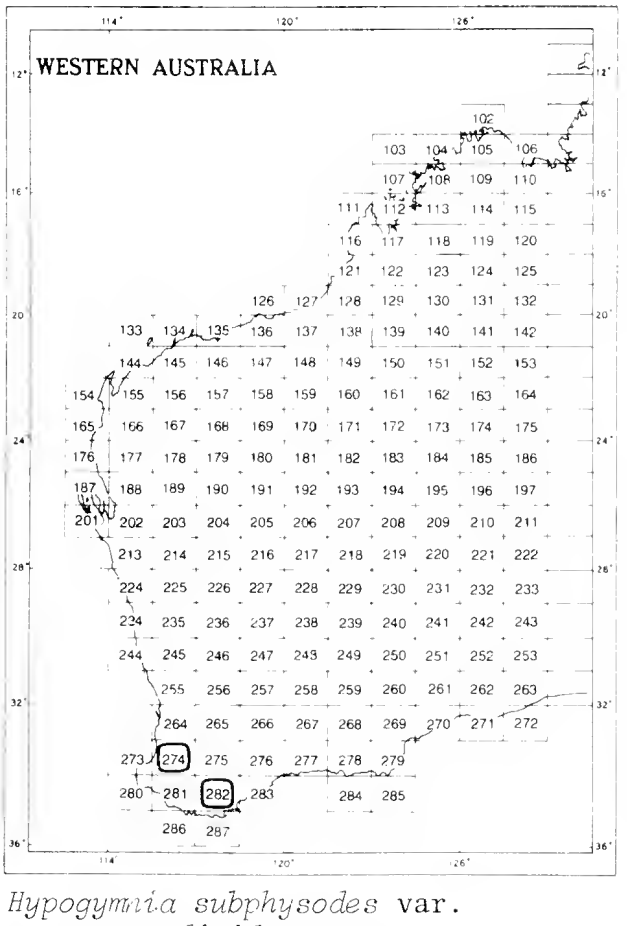
Heterodermia obscurata (Nyl.) Trevis



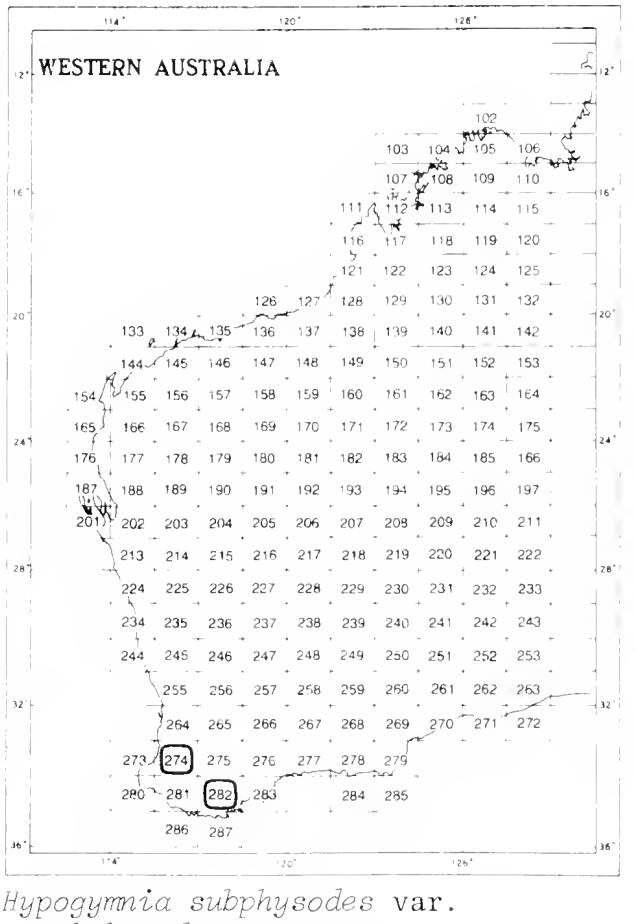
Heterodermia japonica Kurokawa



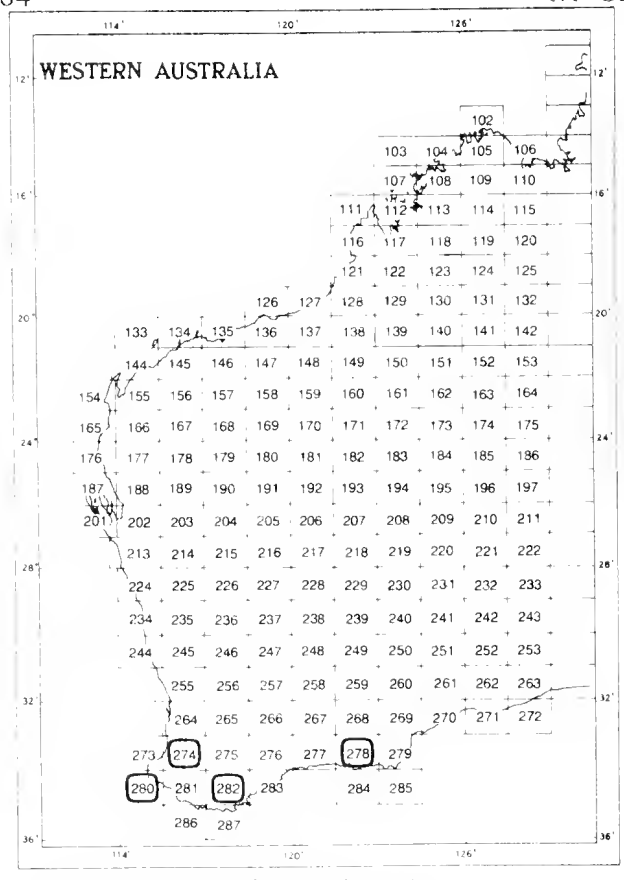
Hypogymnia pulchrilobata (Bitt.) Elix



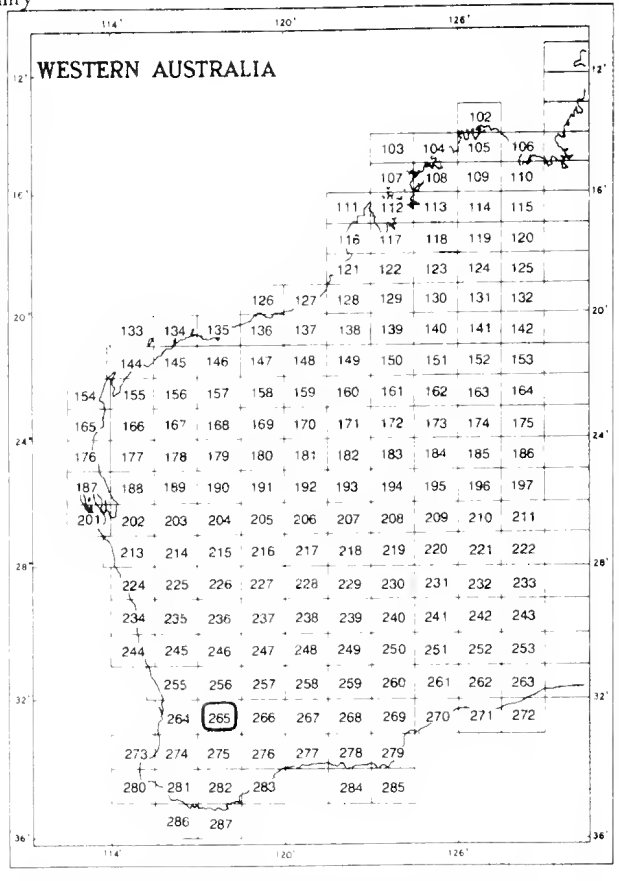
Hypogymnia subphysodes var. *austrerodioides* Elix



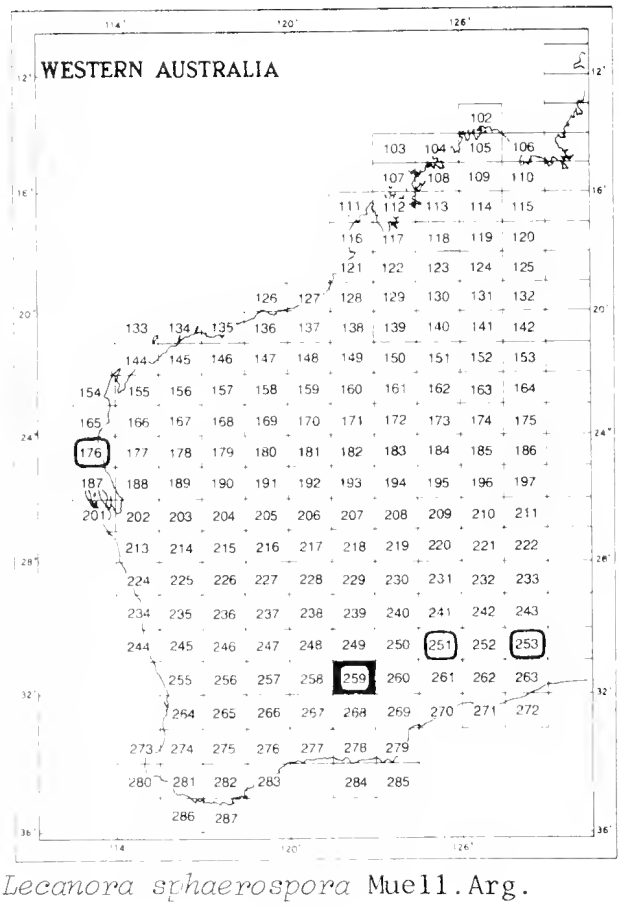
Hypogymnia subphysodes var. *subphysodes* R.Filson



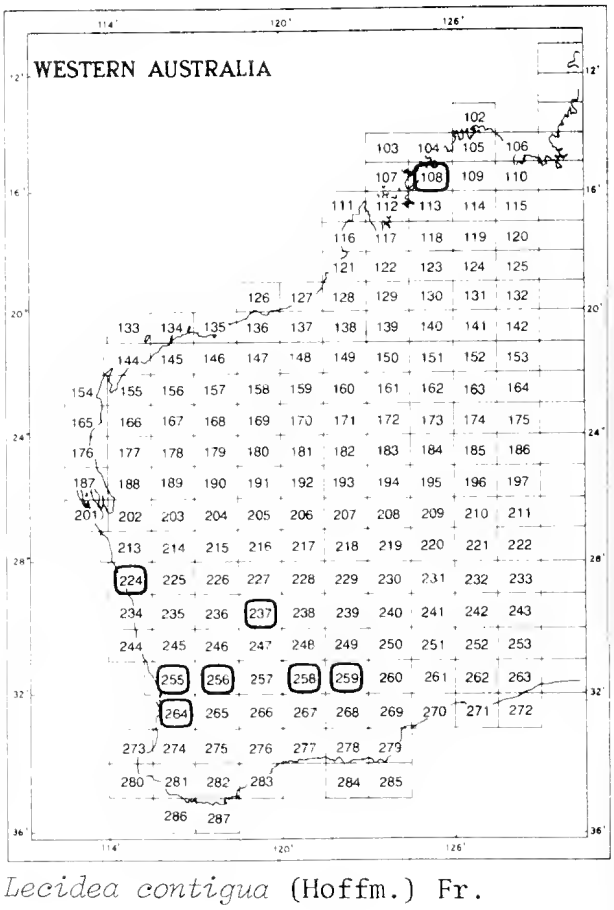
Lecanora atra (Huds.) Ach.



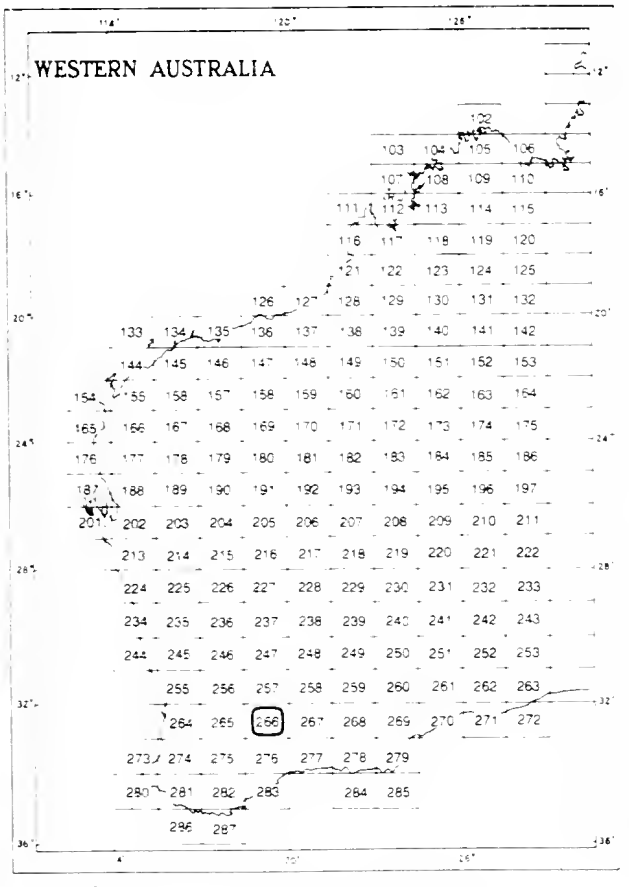
Lecanora cancriformis (Hoffm.) Vain.



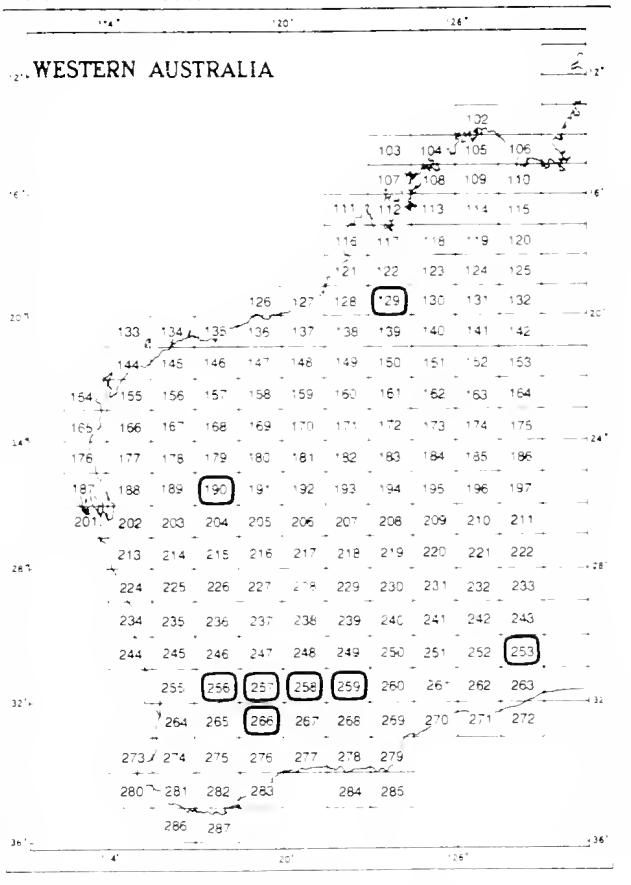
**Lecanora sphaerospora* Muell.Arg.



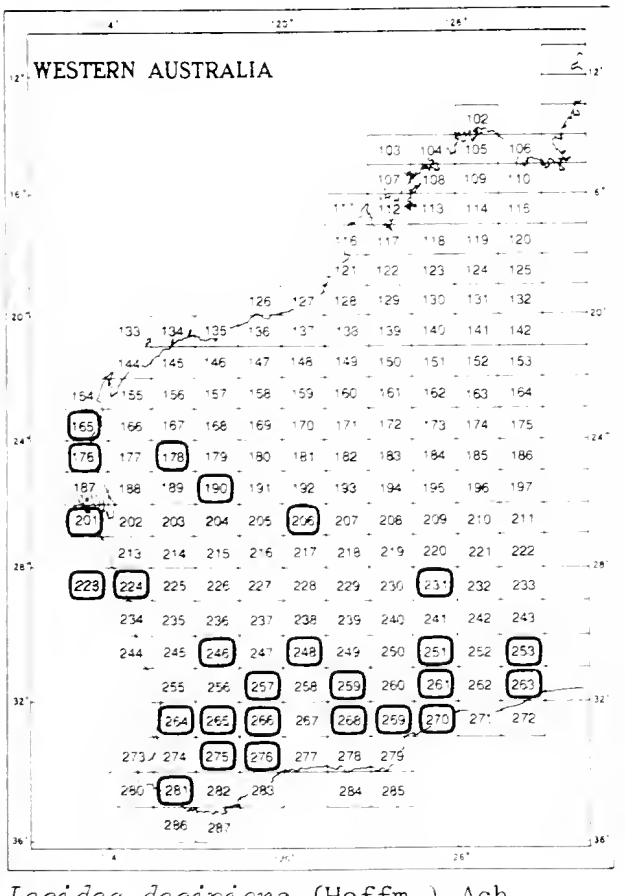
Lecidea contigua (Hoffm.) Fr.



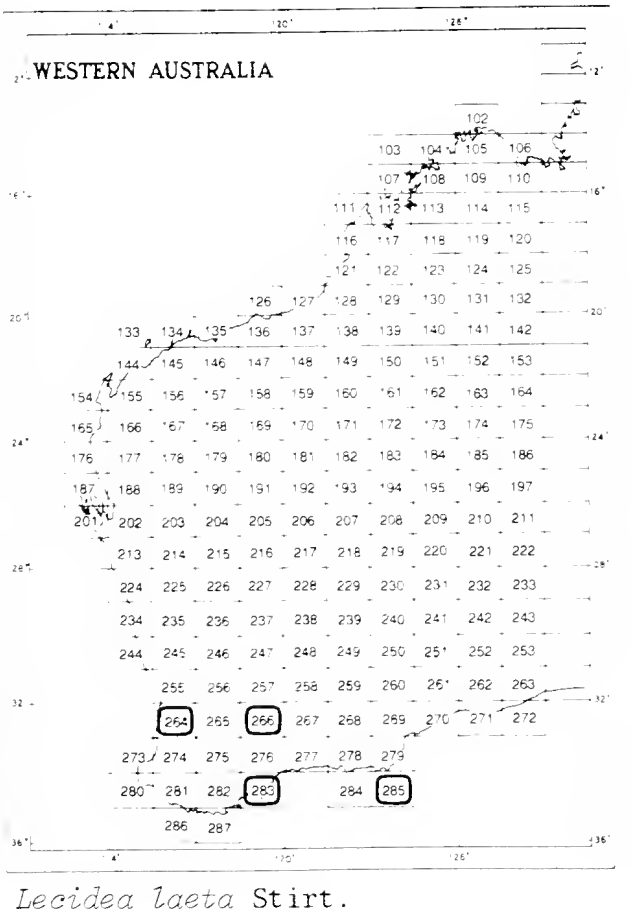
Lecidea croactata (Sm.) Nyl.



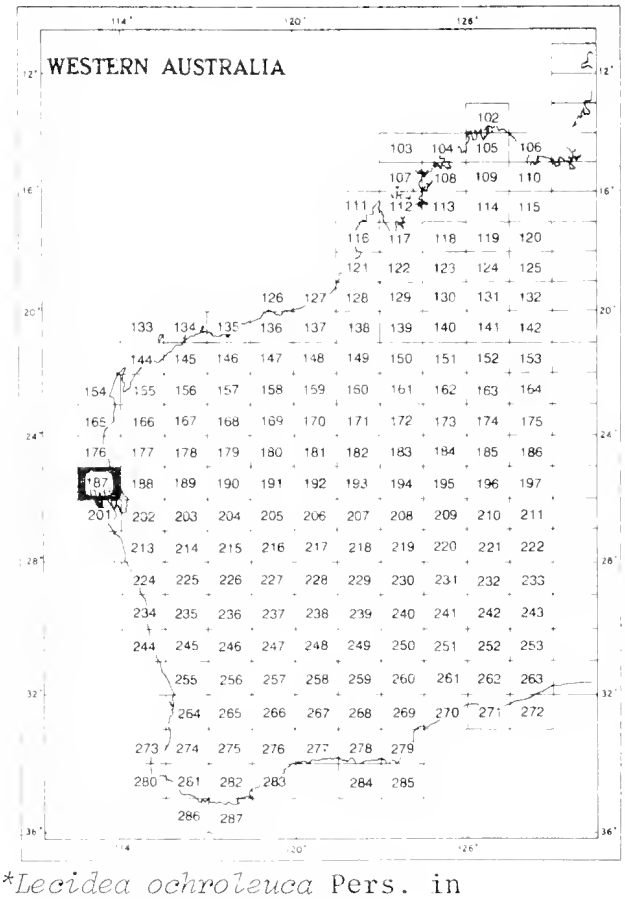
**Lecidea crystallifera* Tayl.



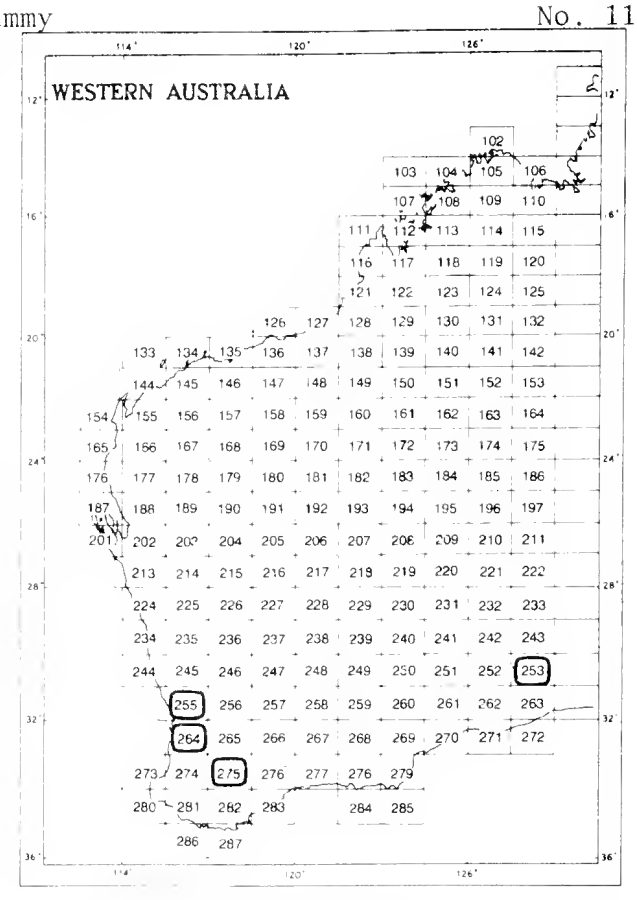
Lecidea decipiens (Hoffm.) Ach.



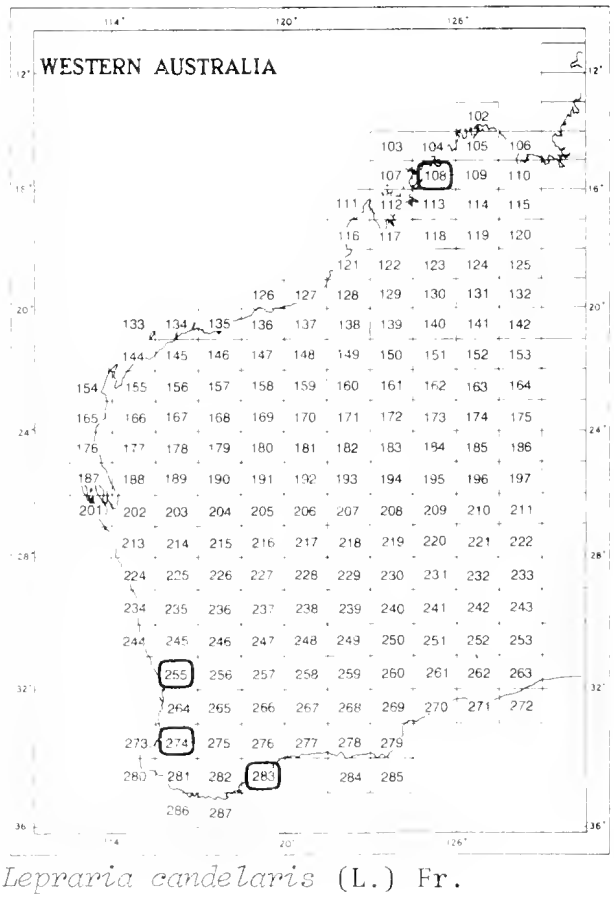
Lecidea laeta Stirt.



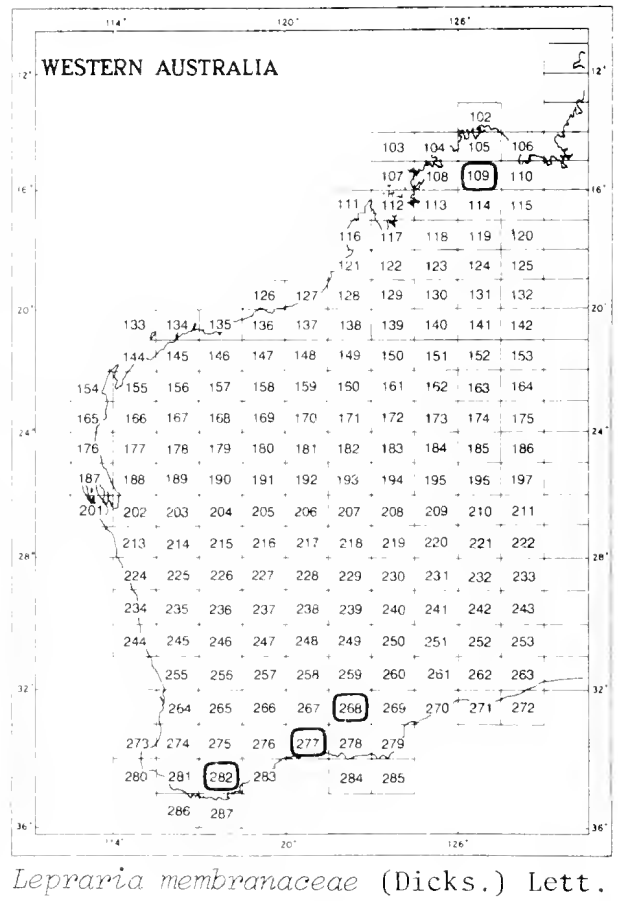
Lecidea ochroleuca Pers. in Gaudichaud



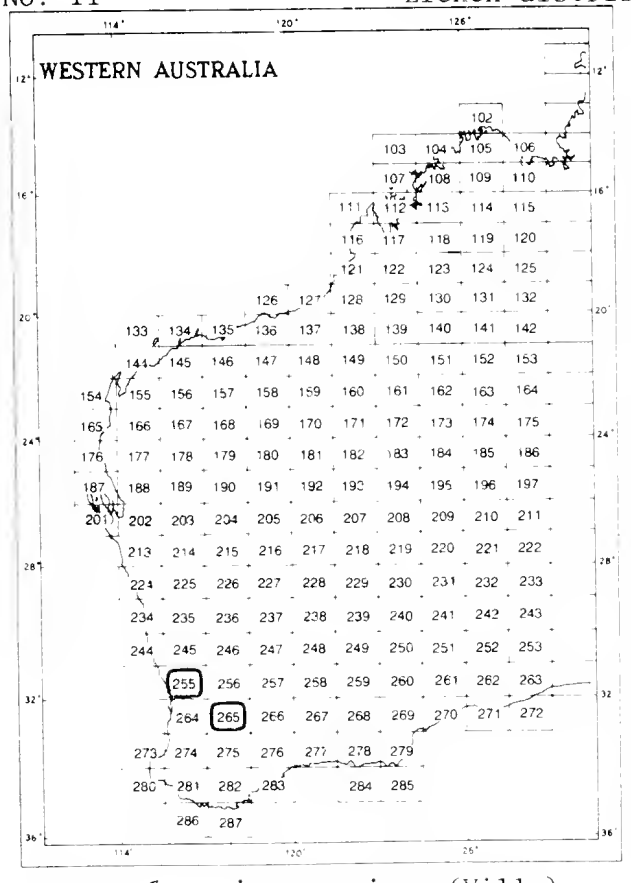
Lecidea planata Muell.Arg.



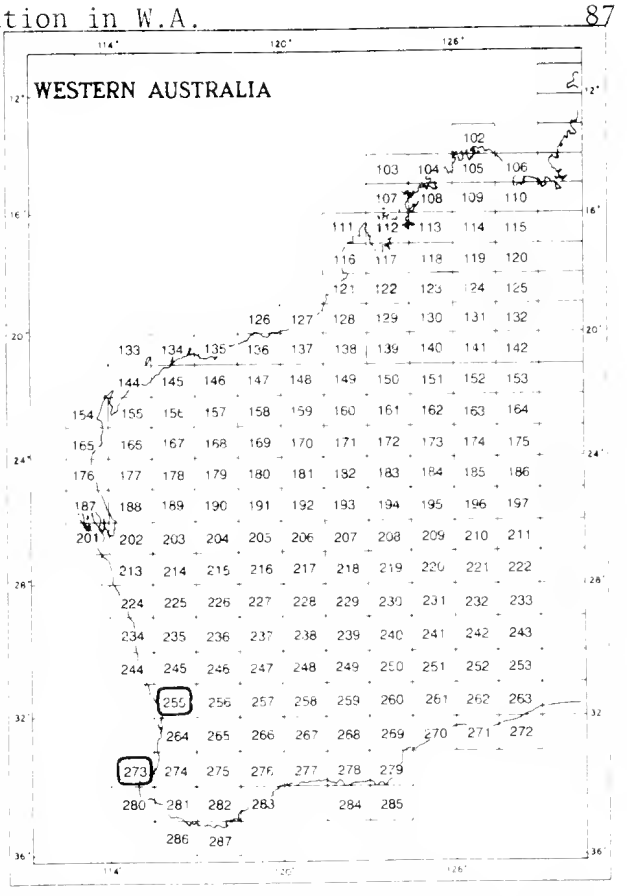
Lepraria candelaris (L.) Fr.



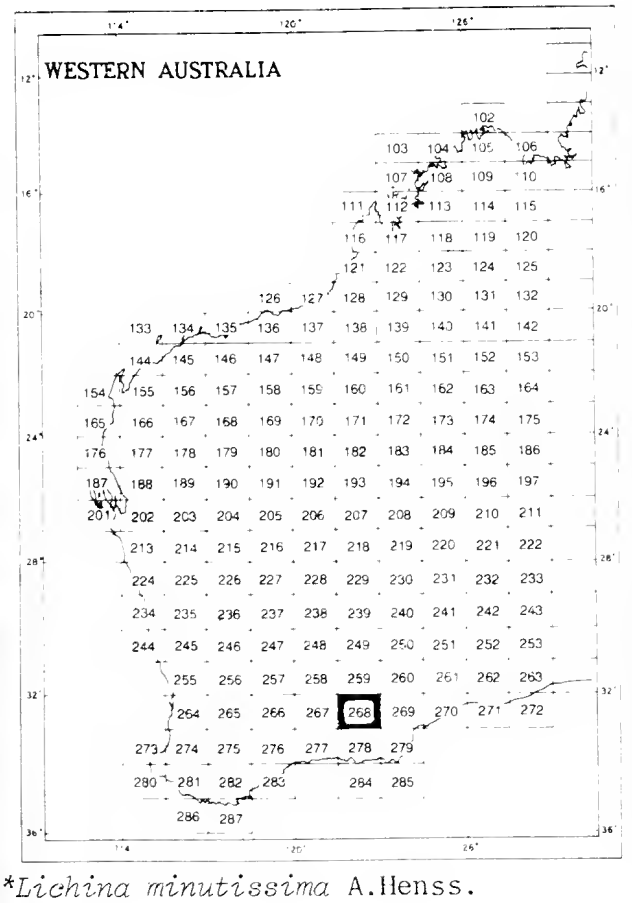
Lepraria membranaceae (Dicks.) Lett.



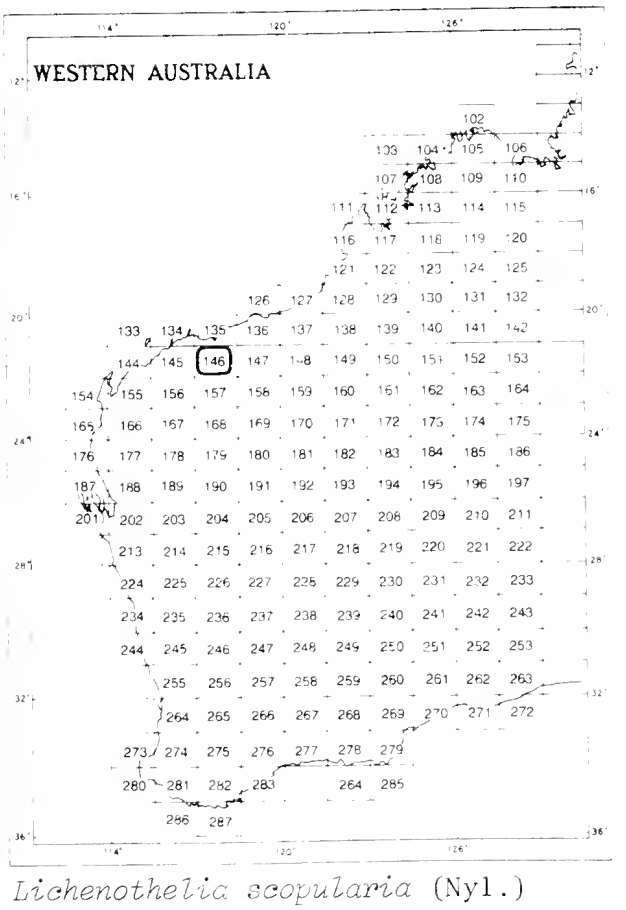
Leprocaulon microscopicum (Vill.) Gams ex Hawksw.



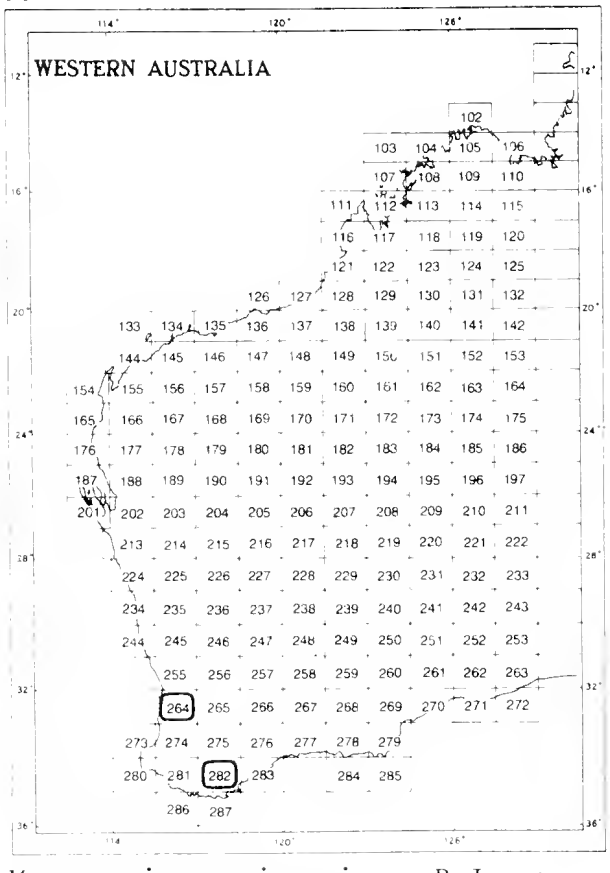
Leptogium phyllocarpum (Pers.) Mont.



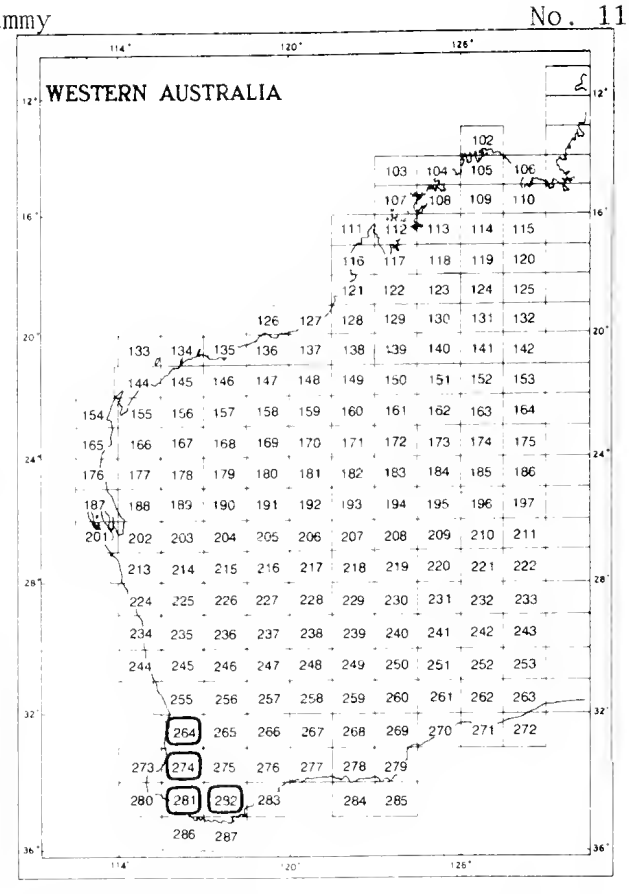
**Lichina minutissima* A.Henss.



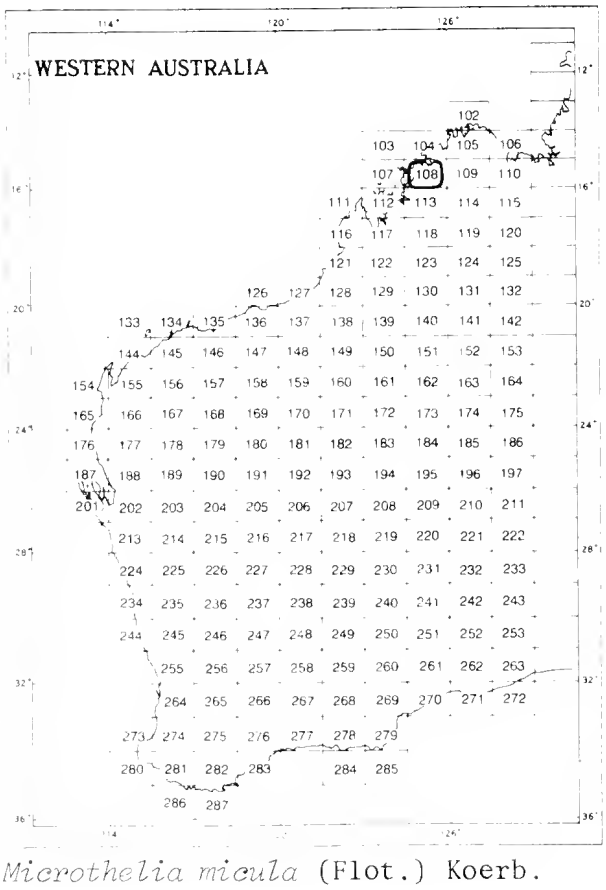
Lichenothelia scopularia (Nyl.) D.Hawksw.



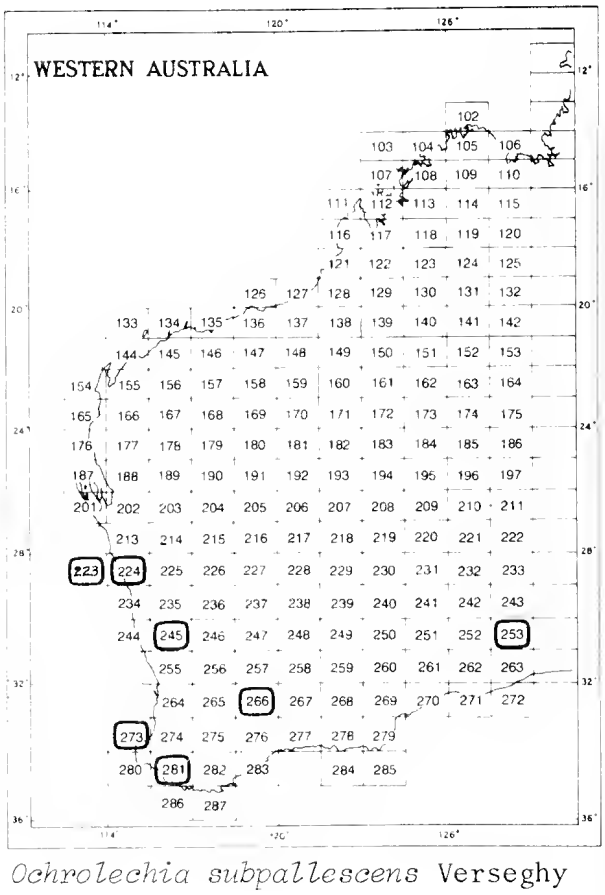
Menegazzia caesiopruinosa P.James



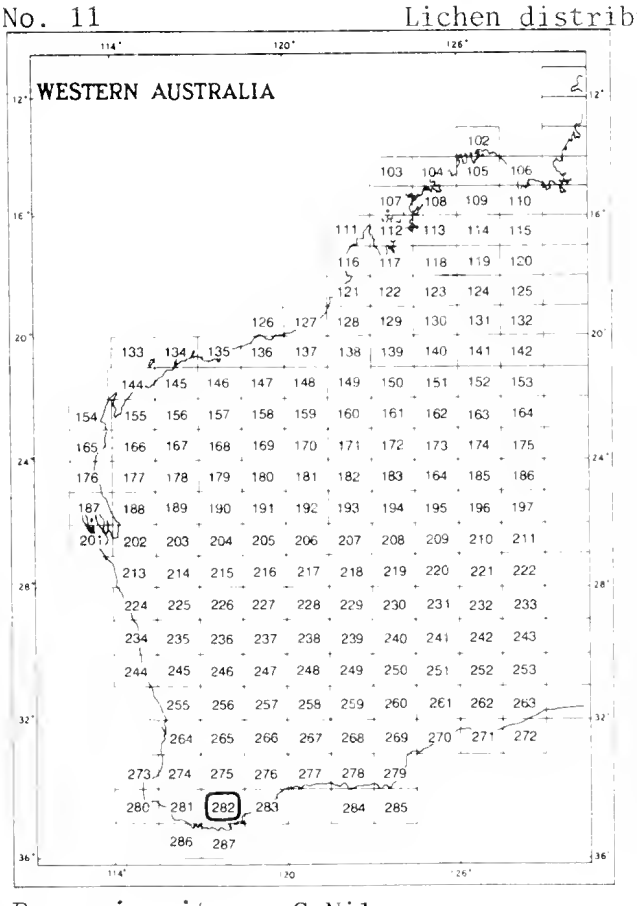
Menegazzia platytrema (Muell.Arg.) Sant.



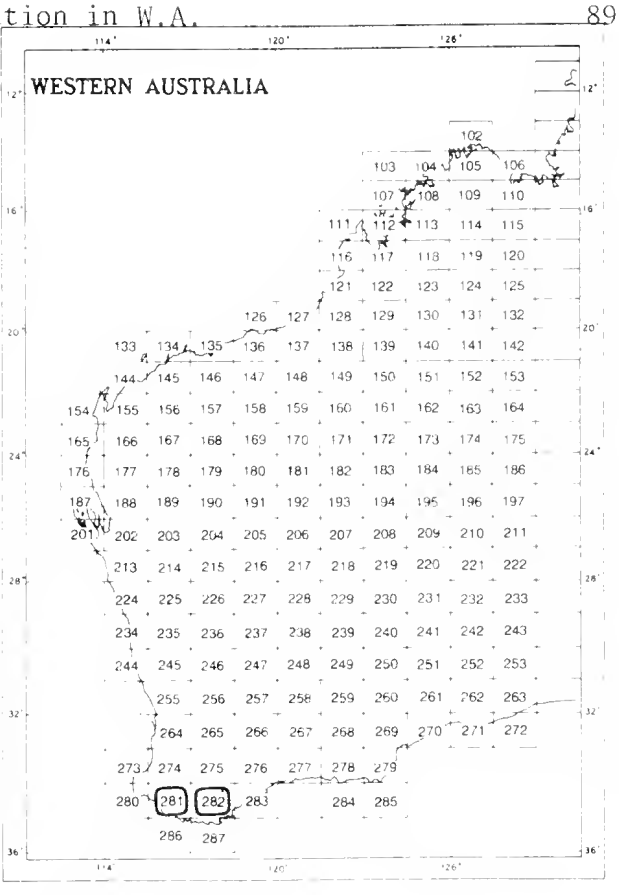
Microthelia micula (Flot.) Koerb.



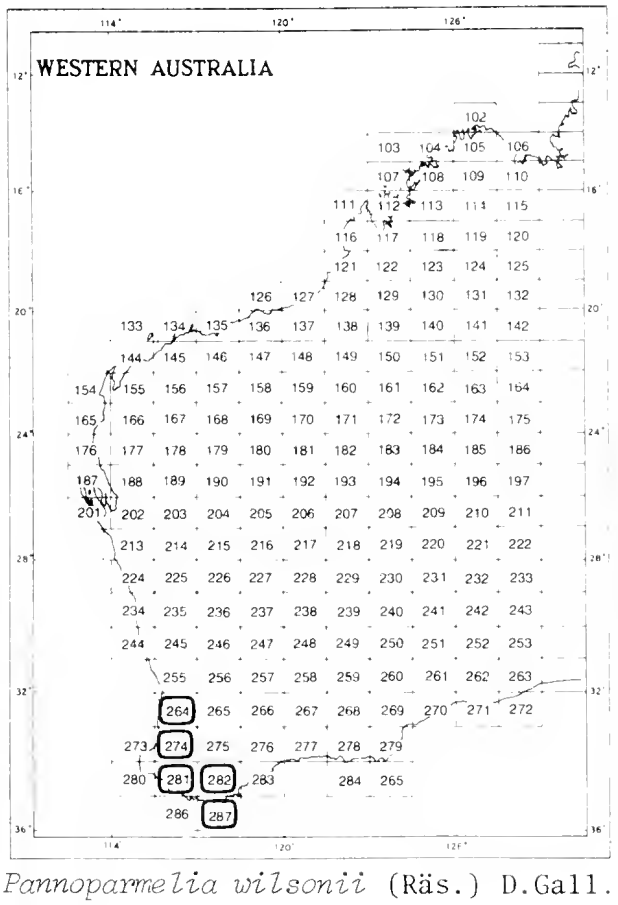
Ochrolechia subpallescens Verseghy



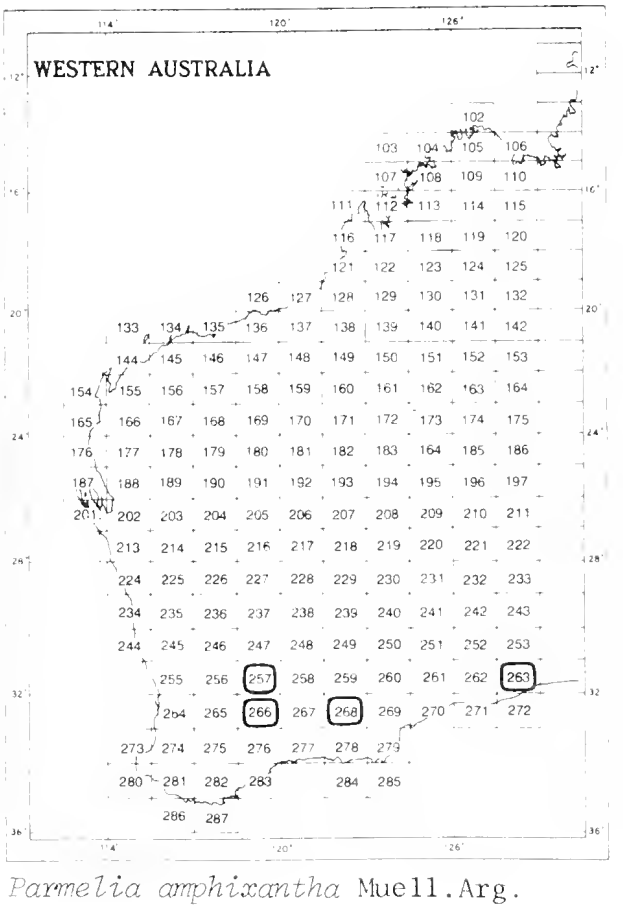
Pannaria pityrea G.Nils.



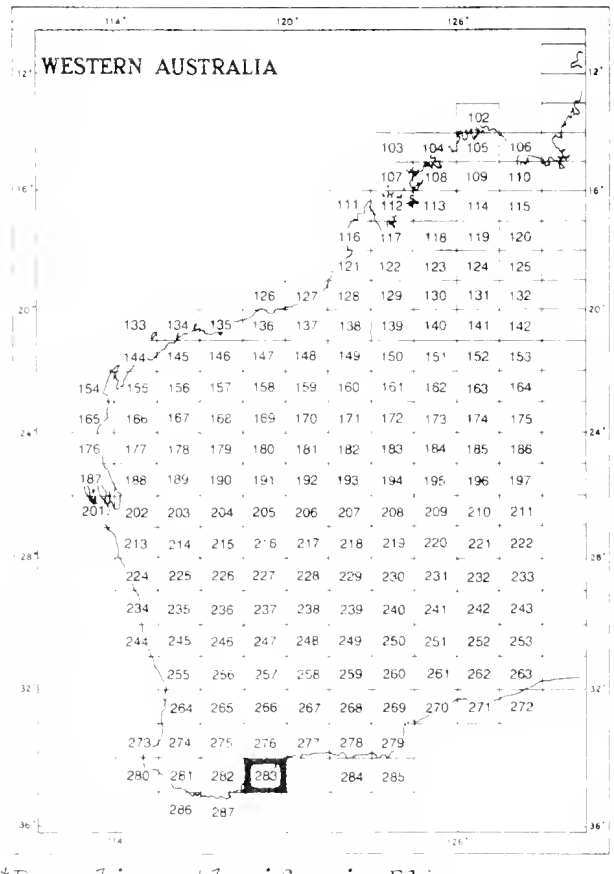
Pannaria rubiginosa (Thunb. ex Ach.) Del.



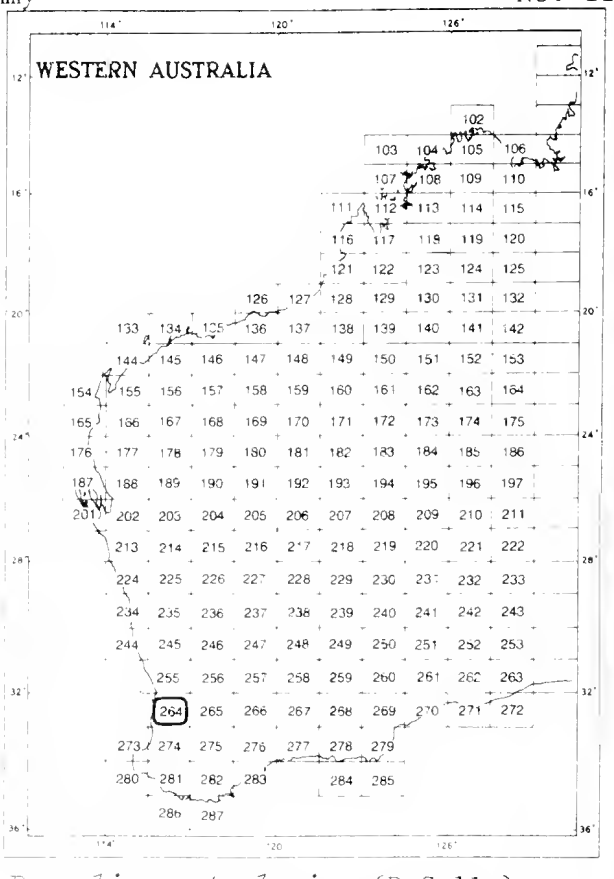
Pannoparmelia wilsonii (Räs.) D.Gall.



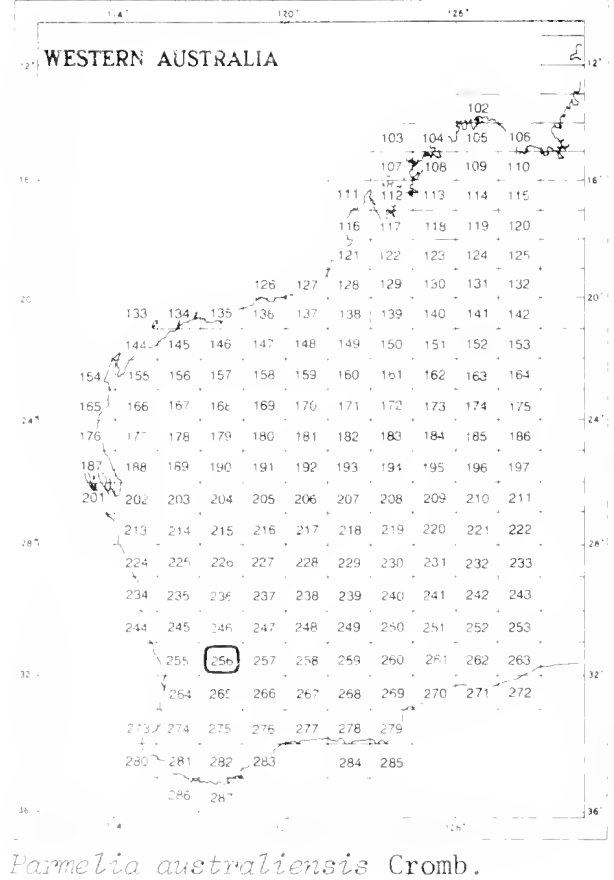
Parmelia amphixantha Muell.Arg.



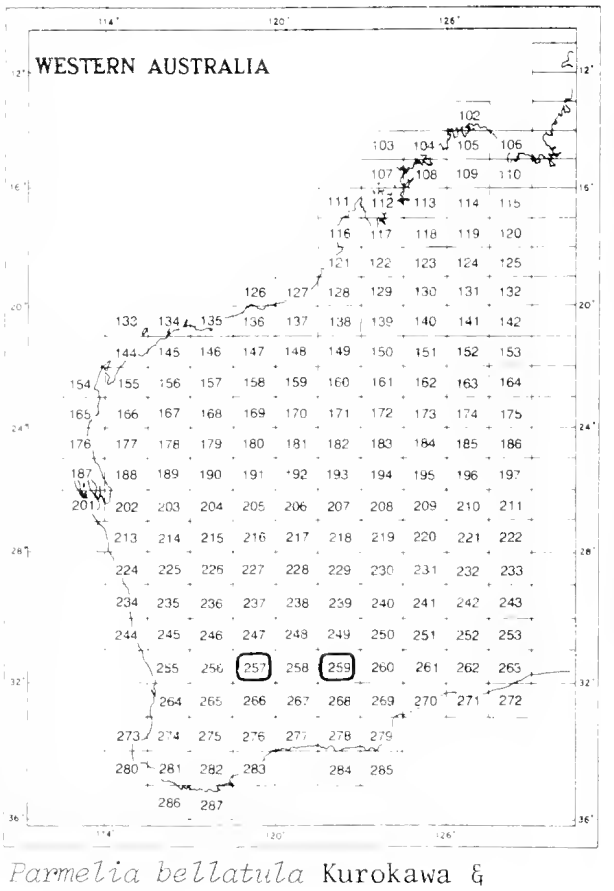
Parmelia antleriformis Elix



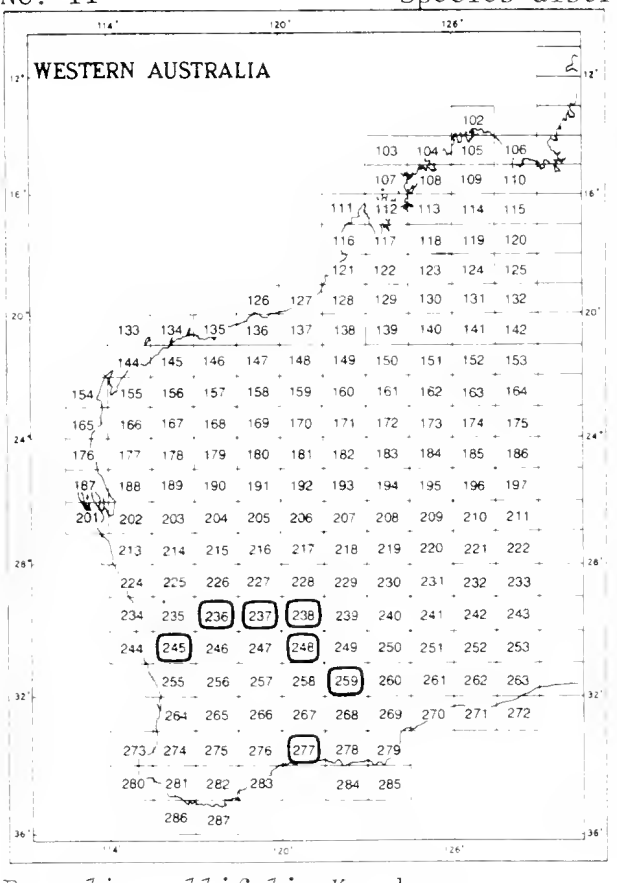
Parmelia australasica (D.Gall.) R.Filson



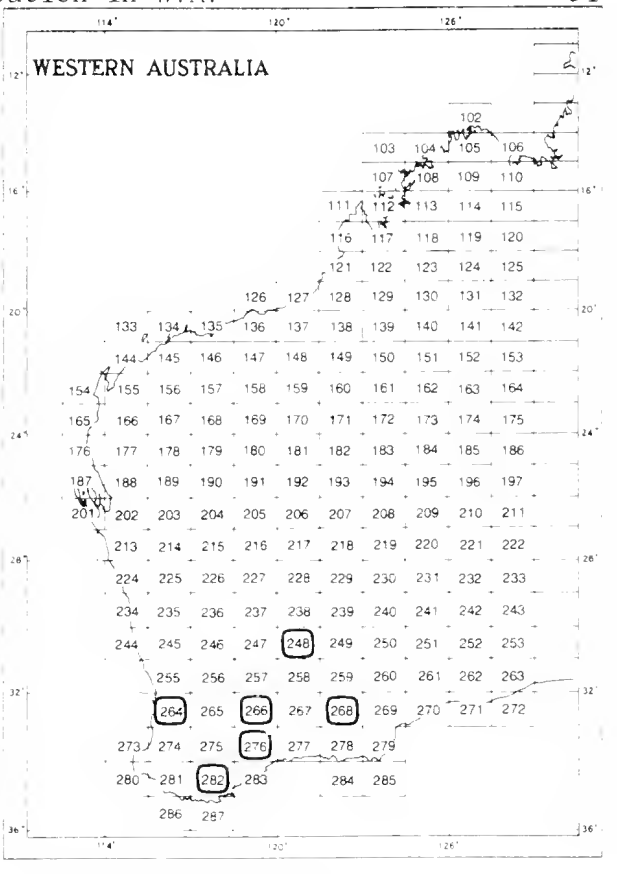
Parmelia australiensis Cromb.



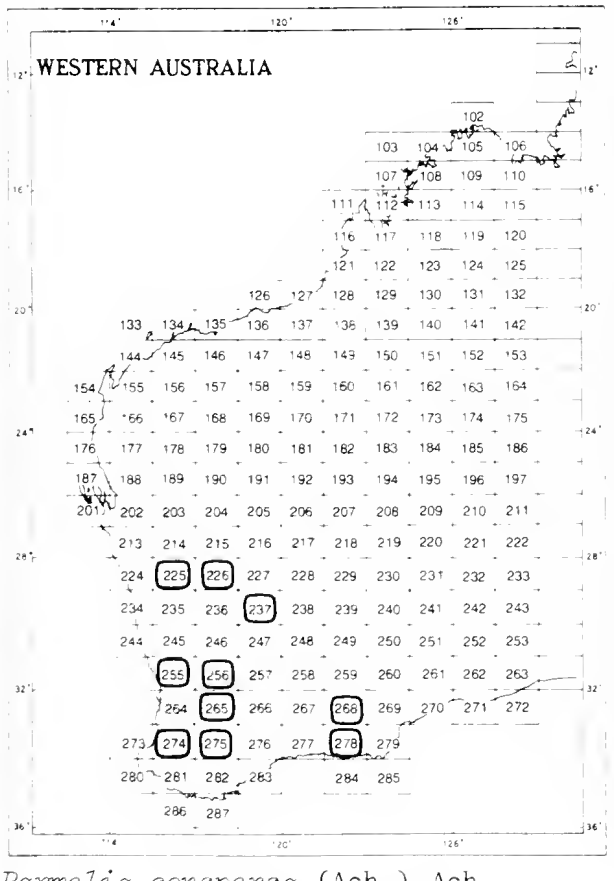
Parmelia bellatula Kurokawa & R.Filson



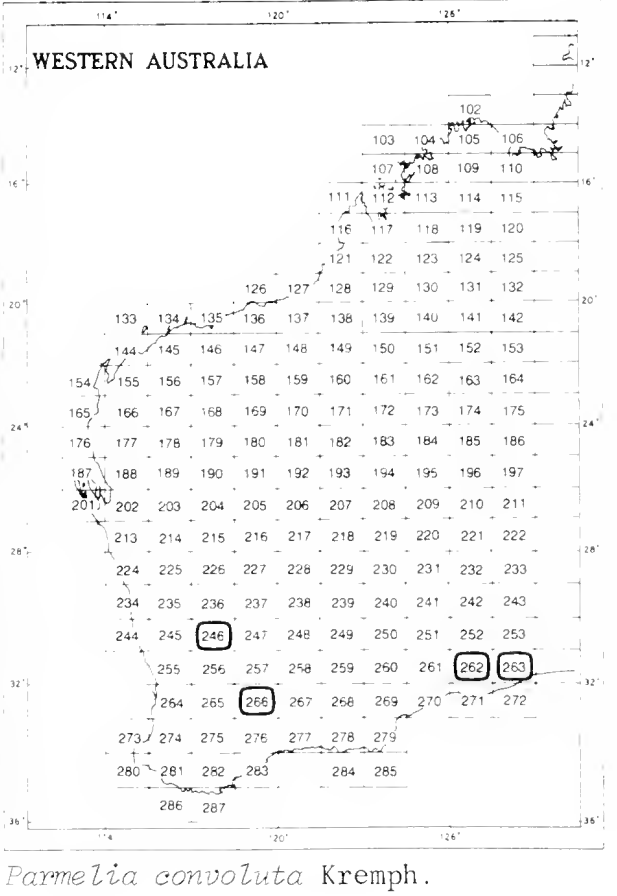
Parmelia callifolia Kurokawa



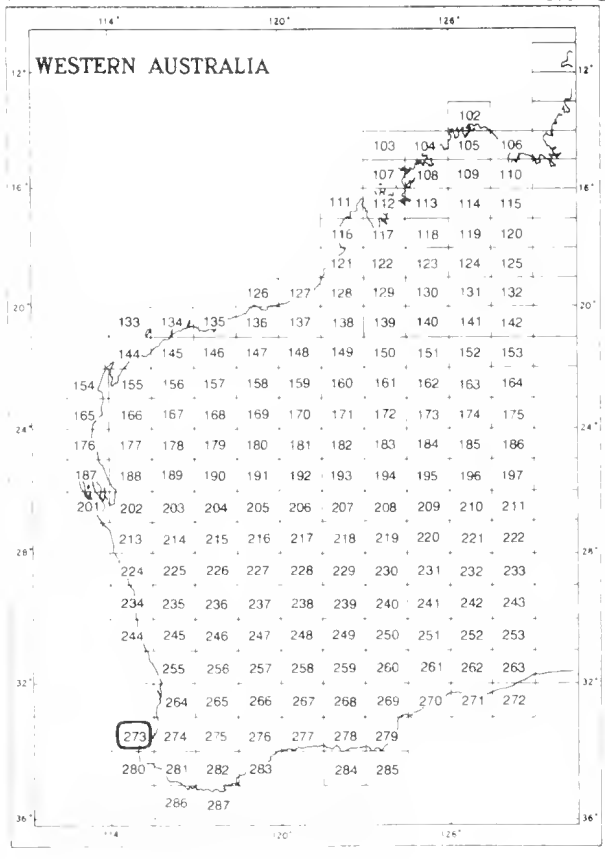
Parmelia cheelii Gyel.



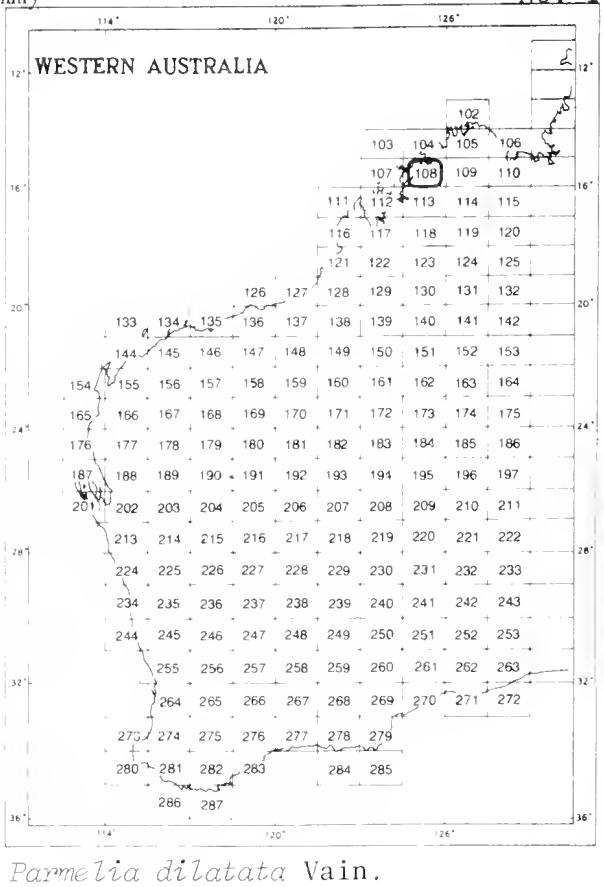
Parmelia conspersa (Ach.) Ach.



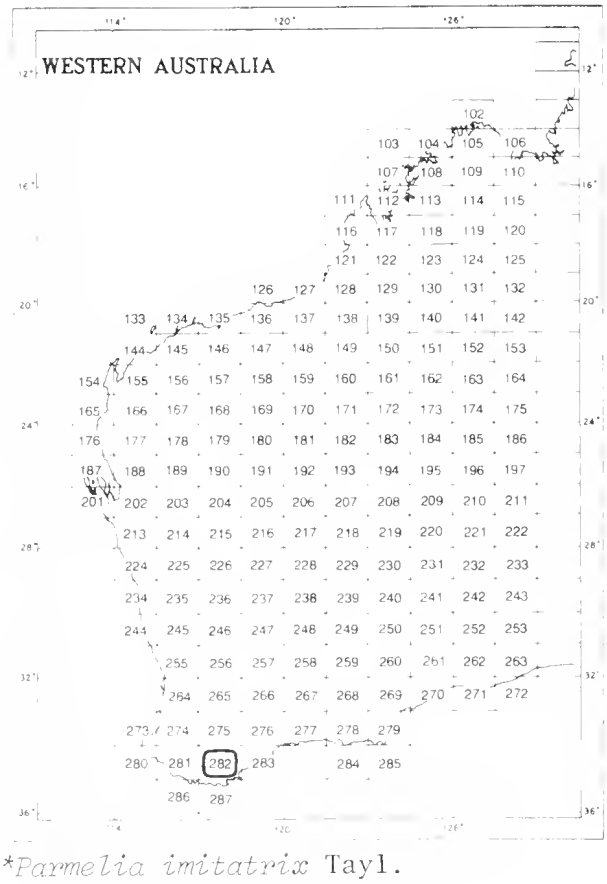
Parmelia convoluta Kremph.



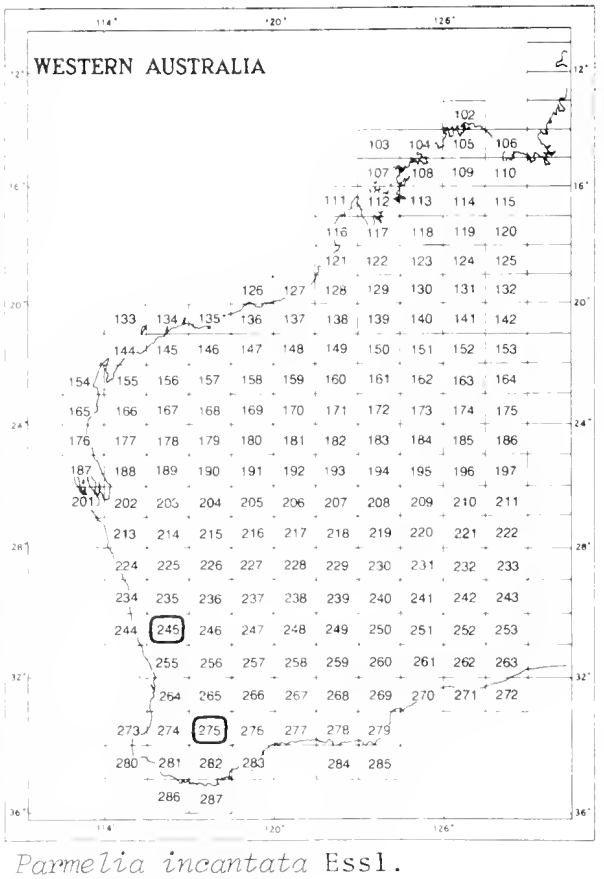
Parmelia cooperi Stein. & Zahlbr.



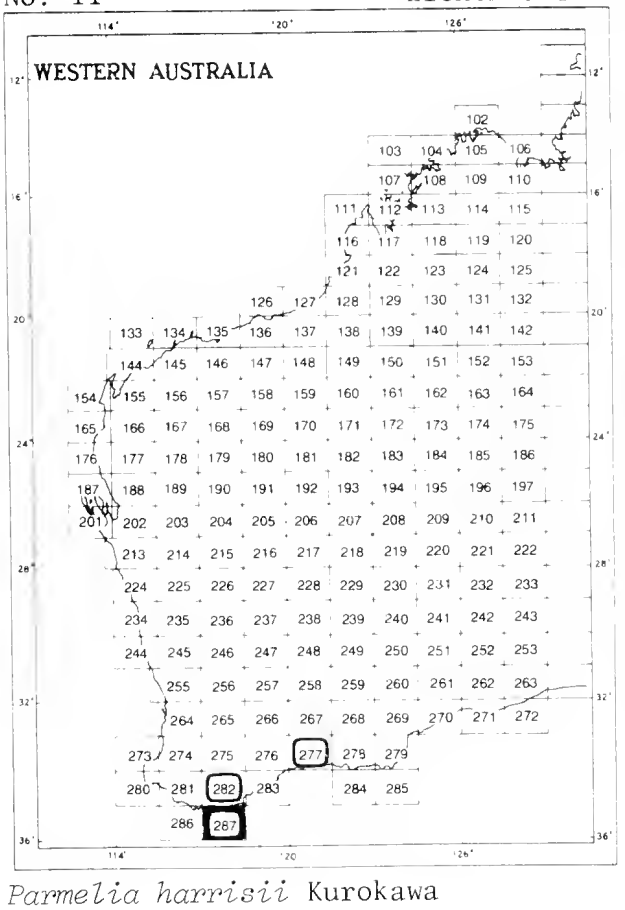
Parmelia dilatata Vain.



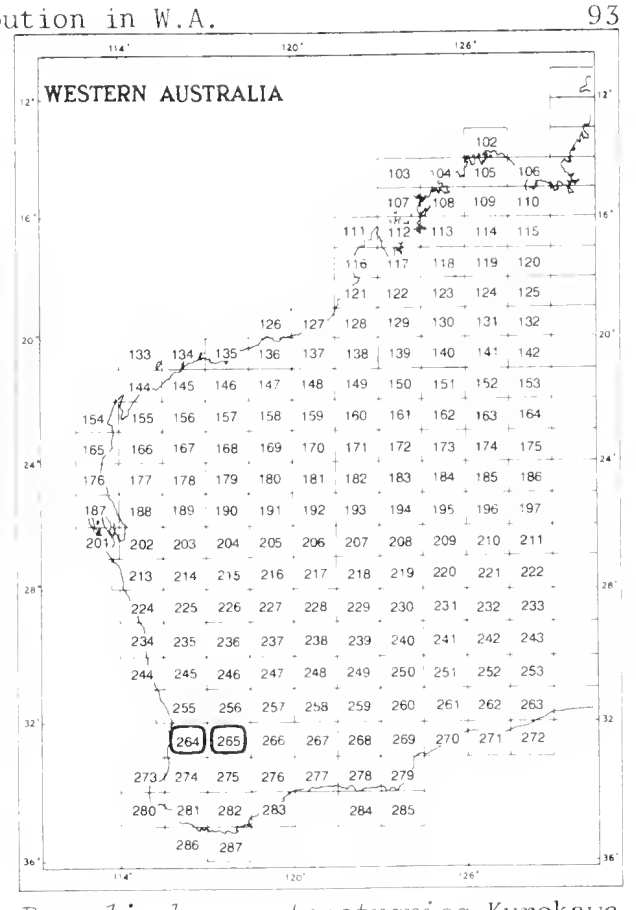
**Parmelia imitatrix* Tayl.



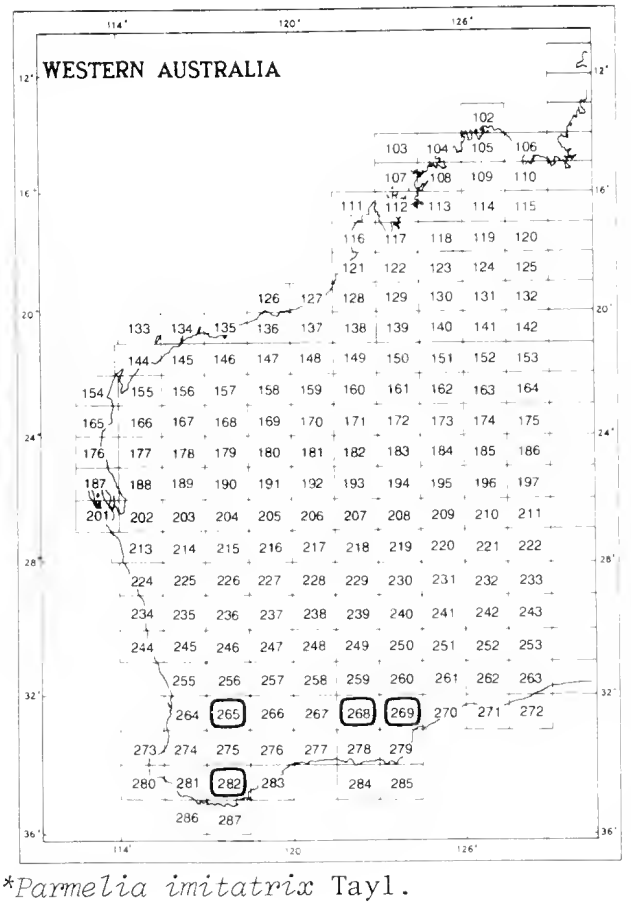
Parmelia incantata Essl.



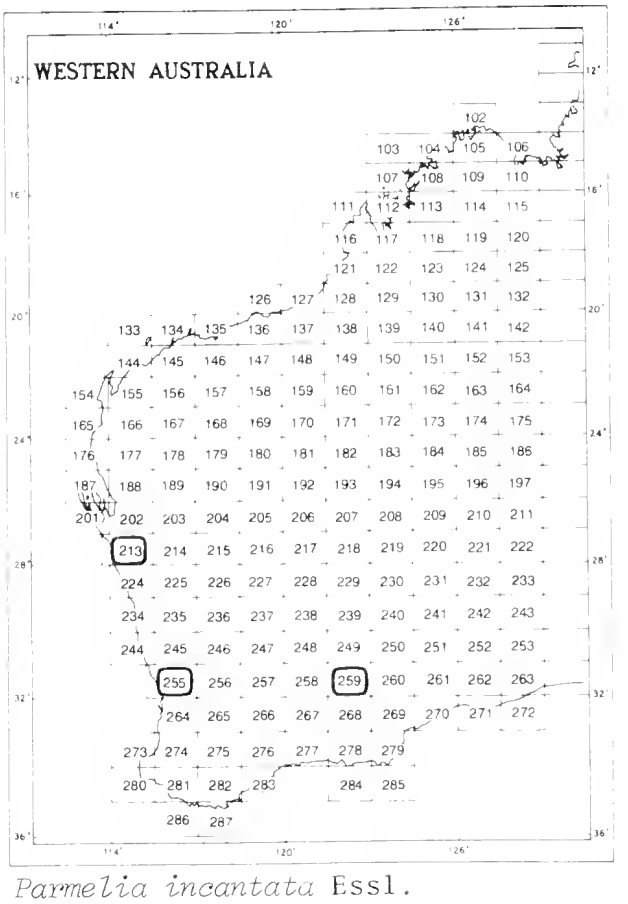
Parmelia harrisii Kurokawa



Parmelia hypoprotocetrarica Kurokawa & Elix



**Parmelia imitatrix* Tayl.



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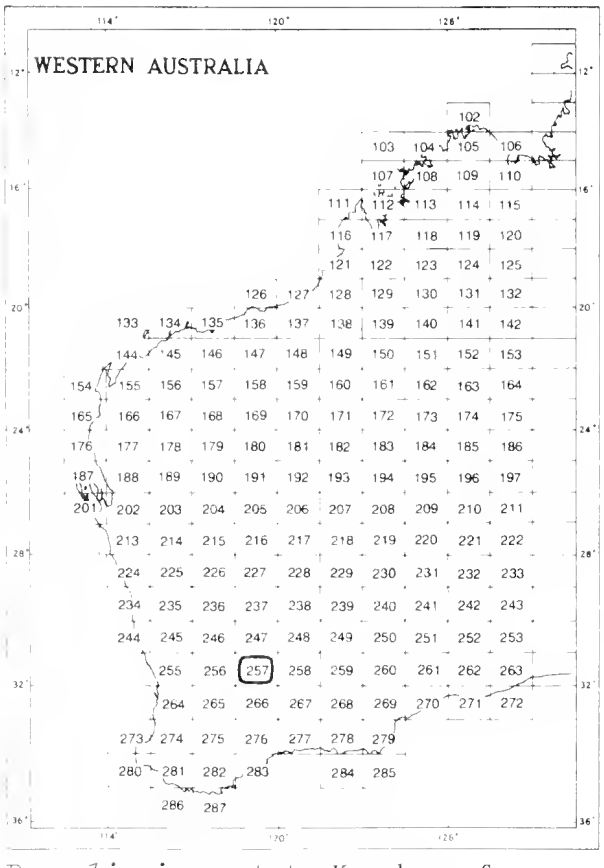
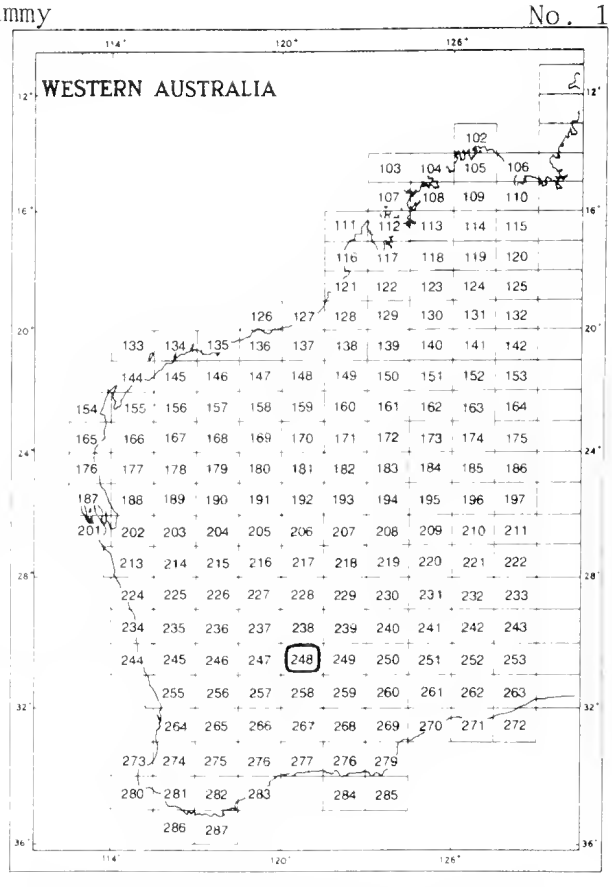
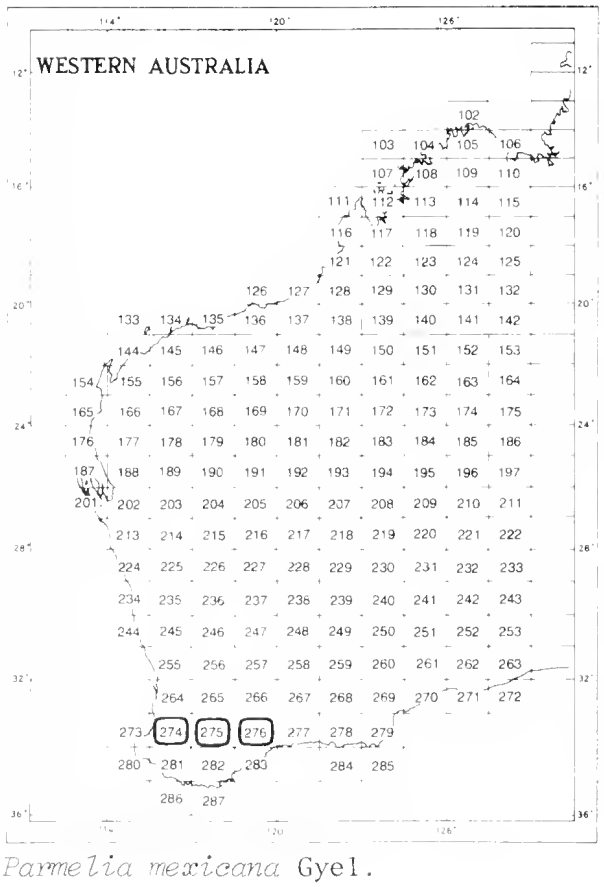


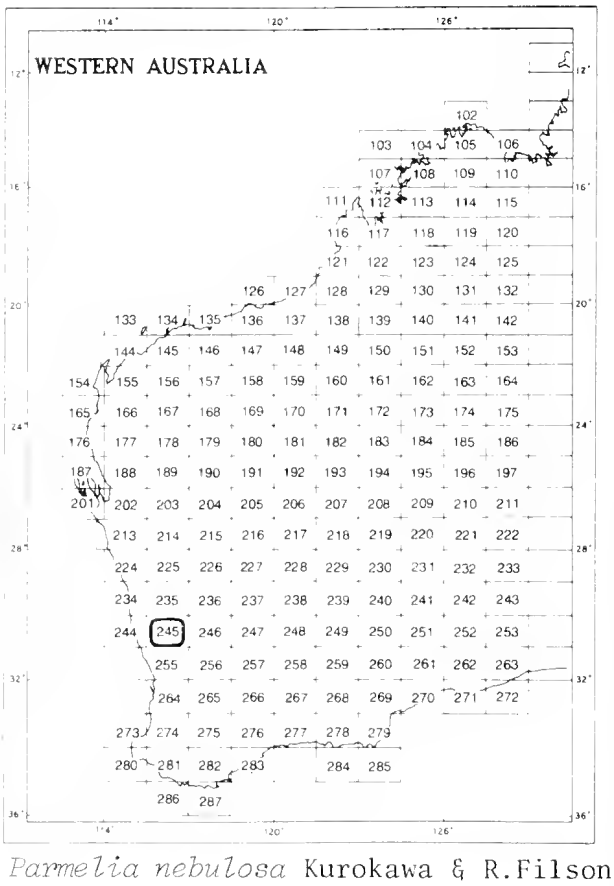
Parmelia incrustata Kurokawa & R.Filson



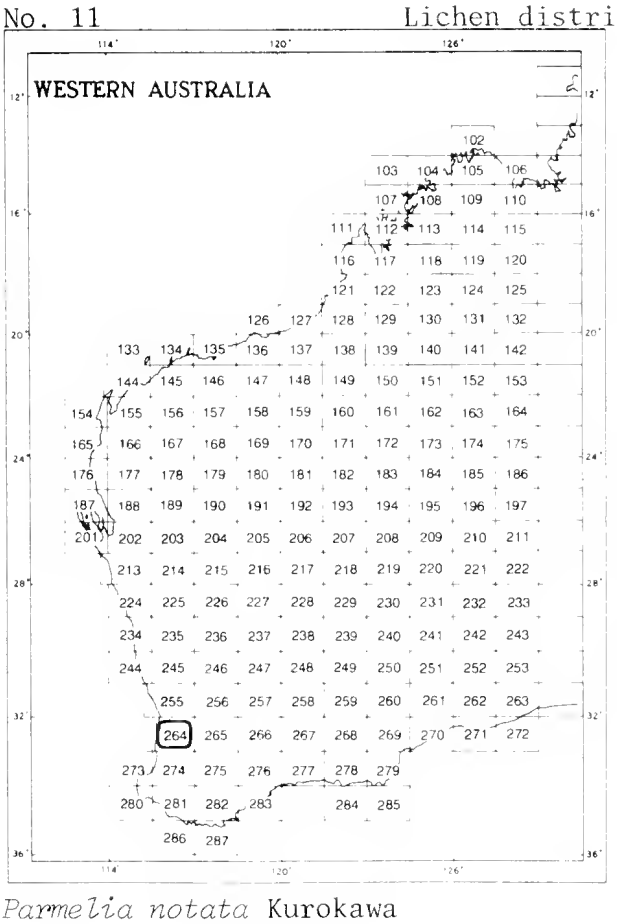
Parmelia metaclystoides Kurokawa & R.Filson



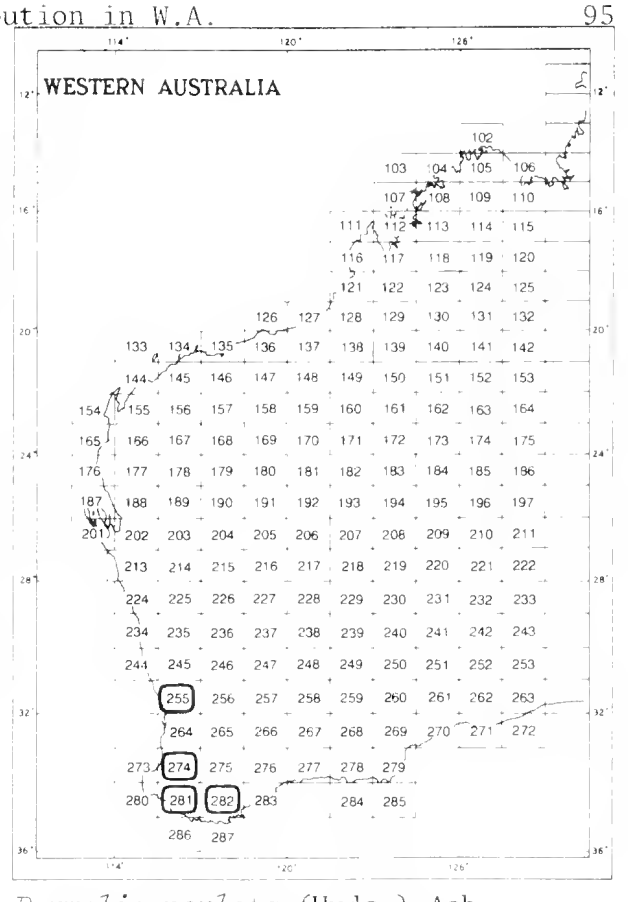
Parmelia mexicana Gyel.



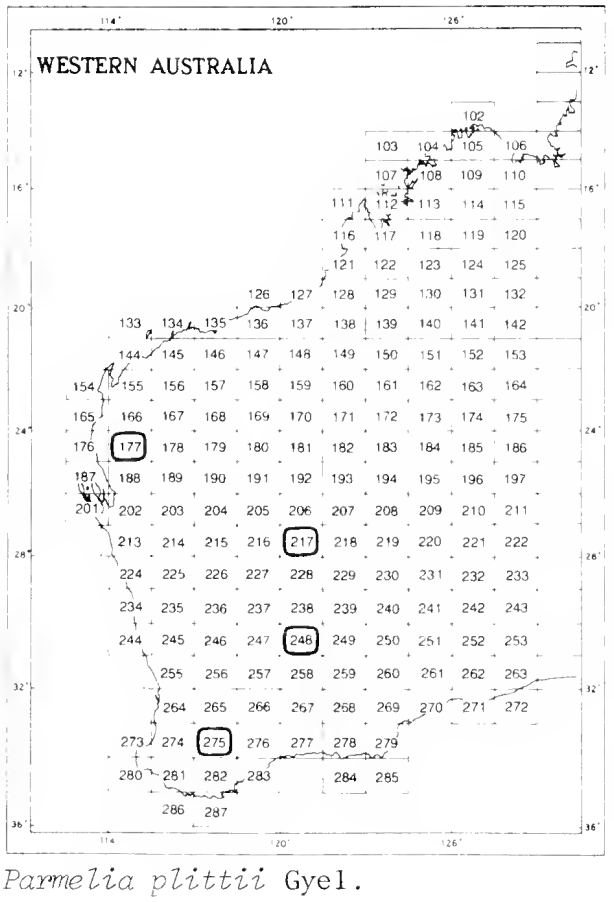
Parmelia nebulosa Kurokawa & R.Filson



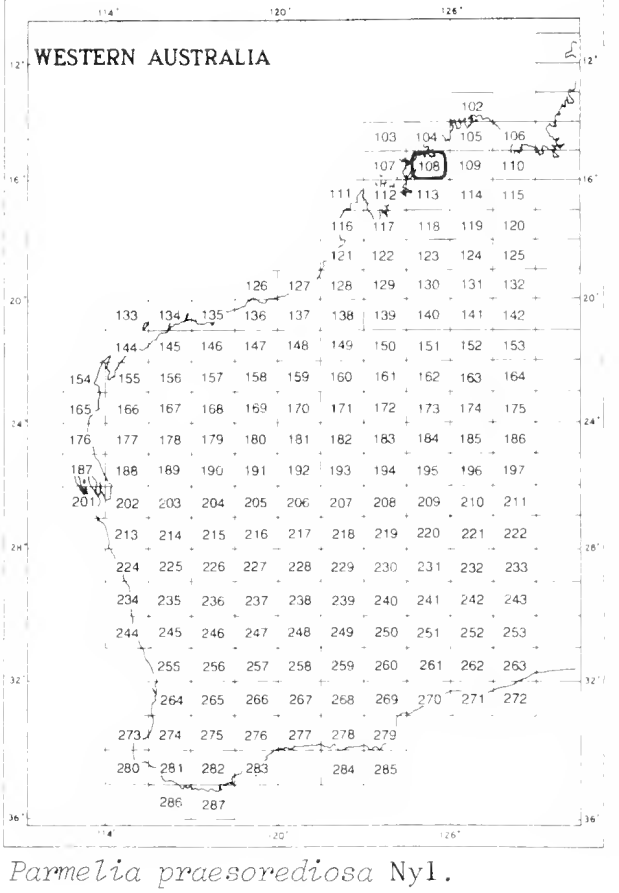
Parmelia notata Kurokawa



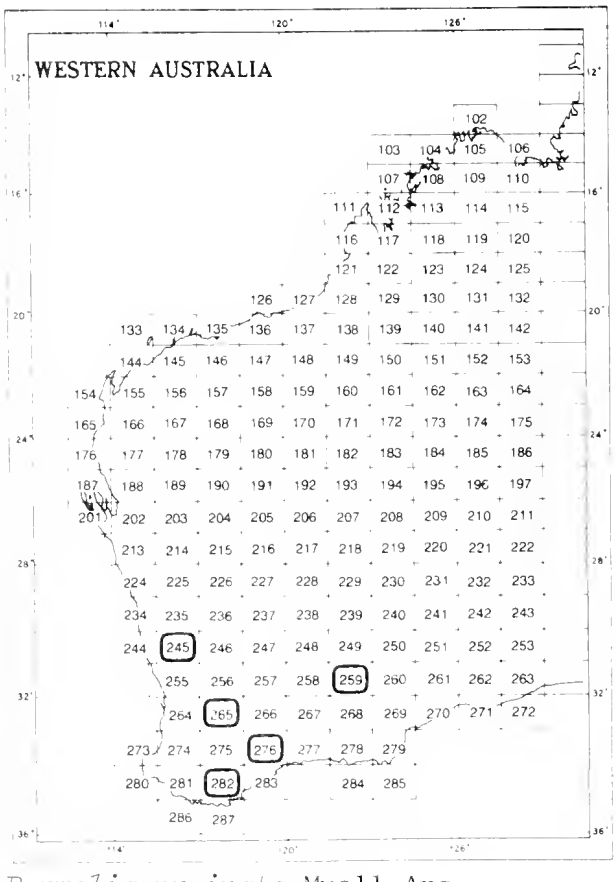
Parmelia perlata (Huds.) Ach.



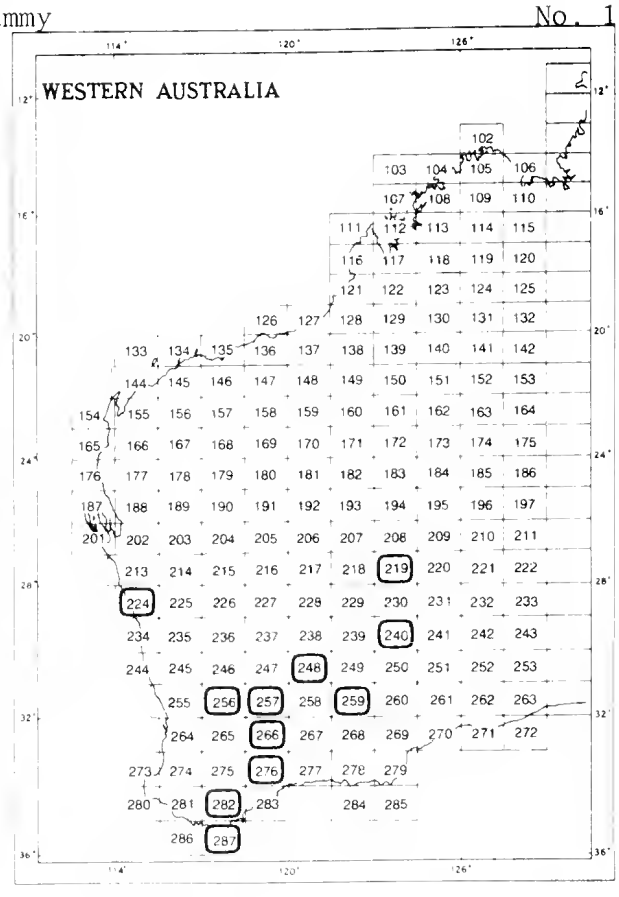
Parmelia plittii Gyel.



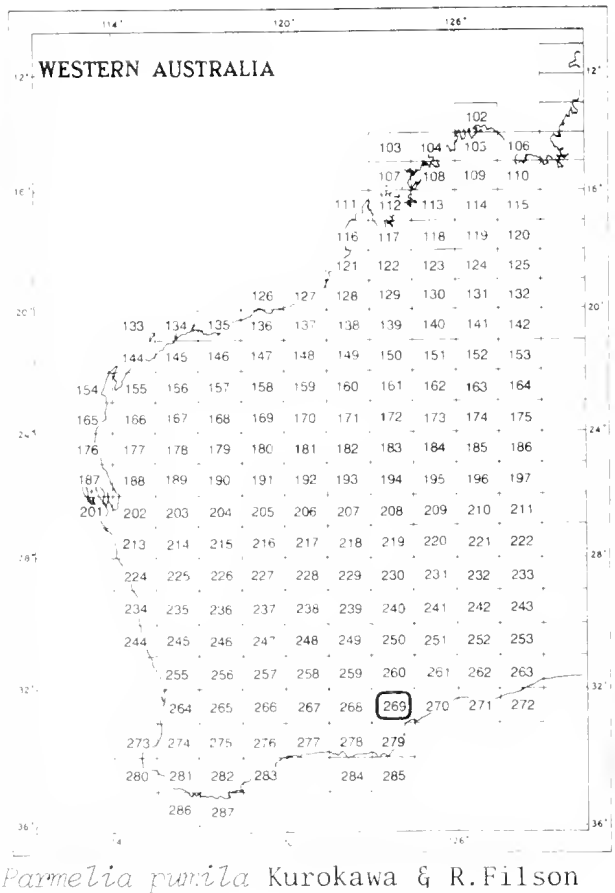
Parmelia praesorediosa Nyl.



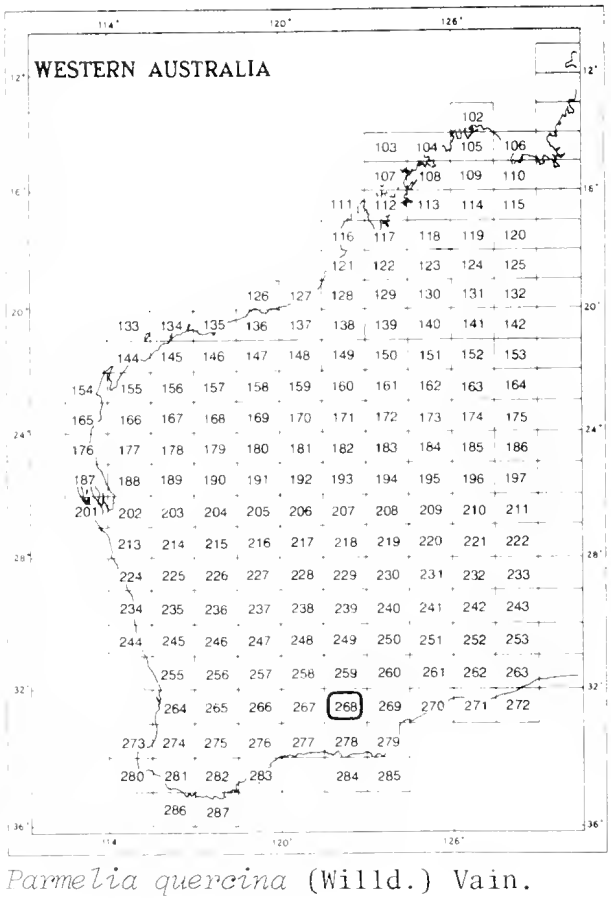
Parmelia pruinata Muell.Arg.



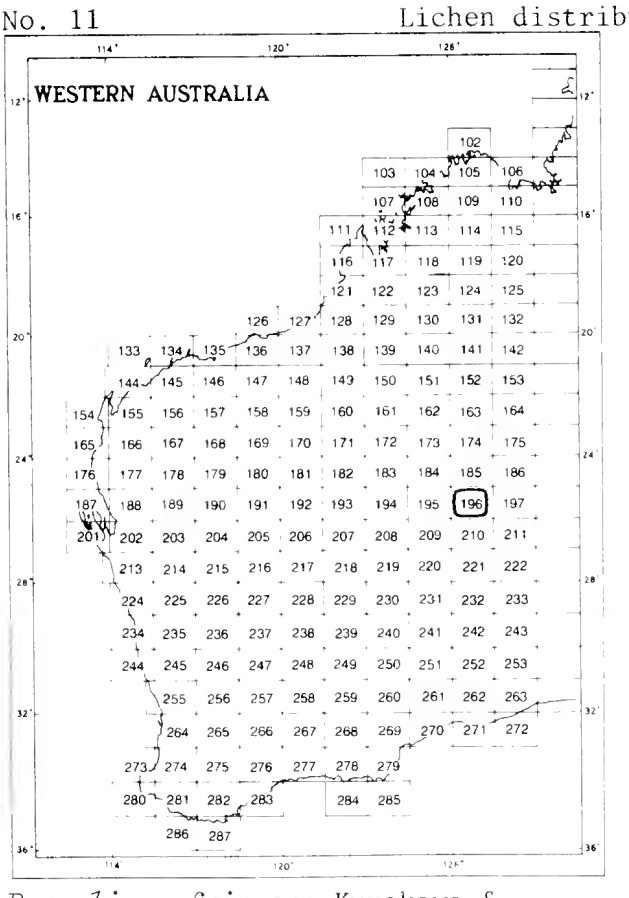
Parmelia pulla (Schreb.) Ach.



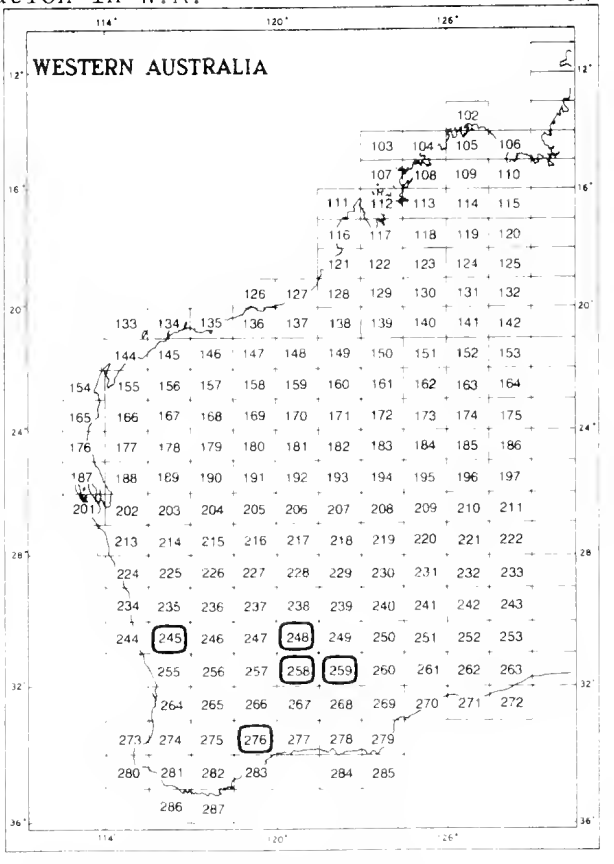
Parmelia pumila Kurokawa & R.Filson



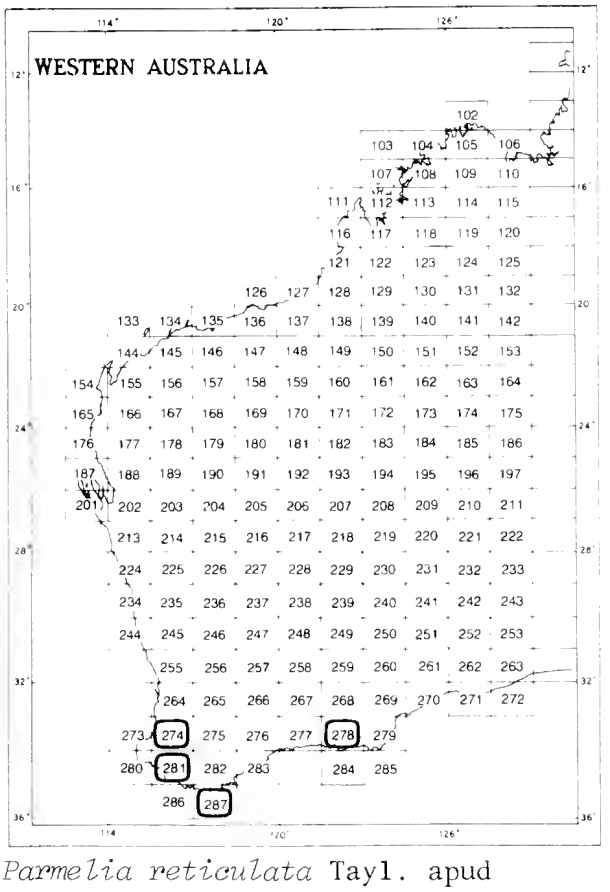
Parmelia quercina (Willd.) Vain.



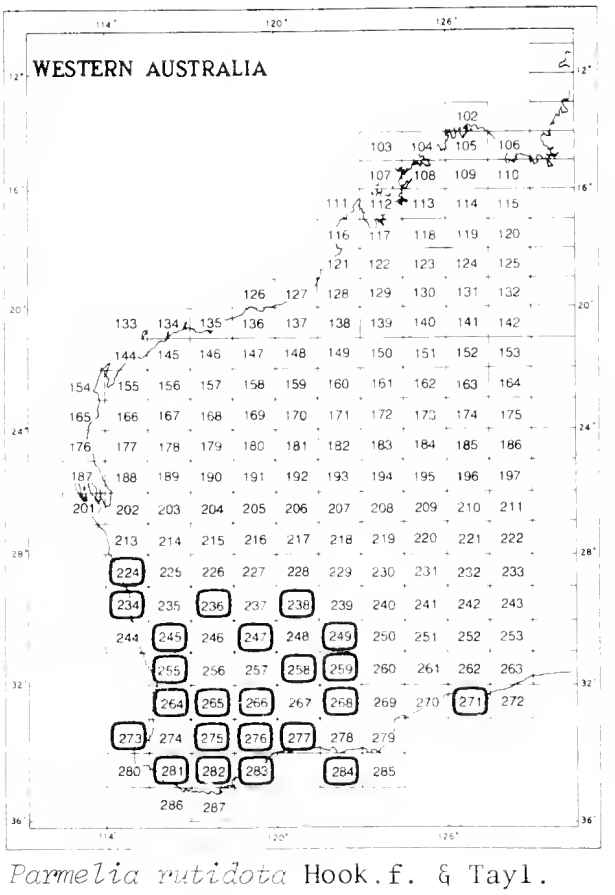
Parmelia refringens Kurokawa & R.Filson



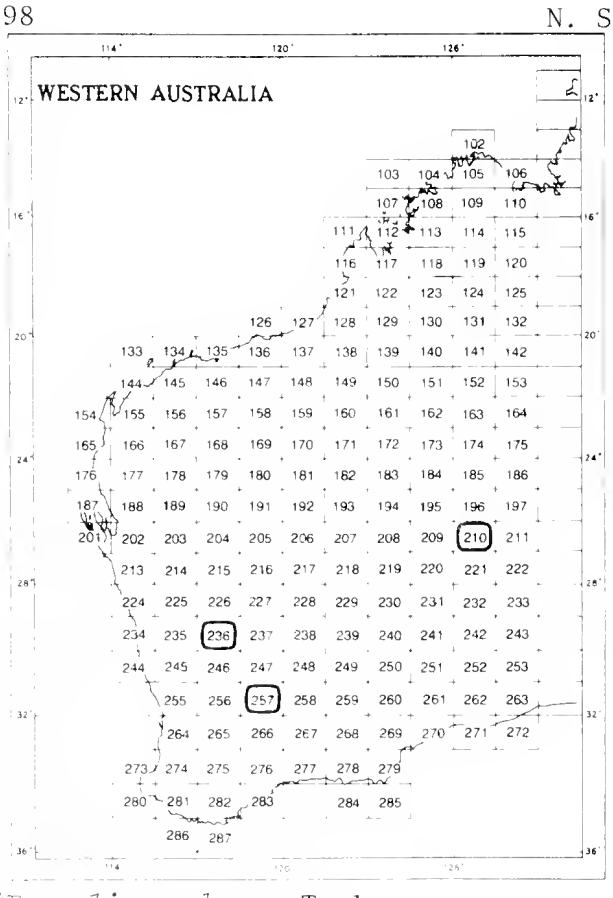
Parmelia reptans Kurokawa



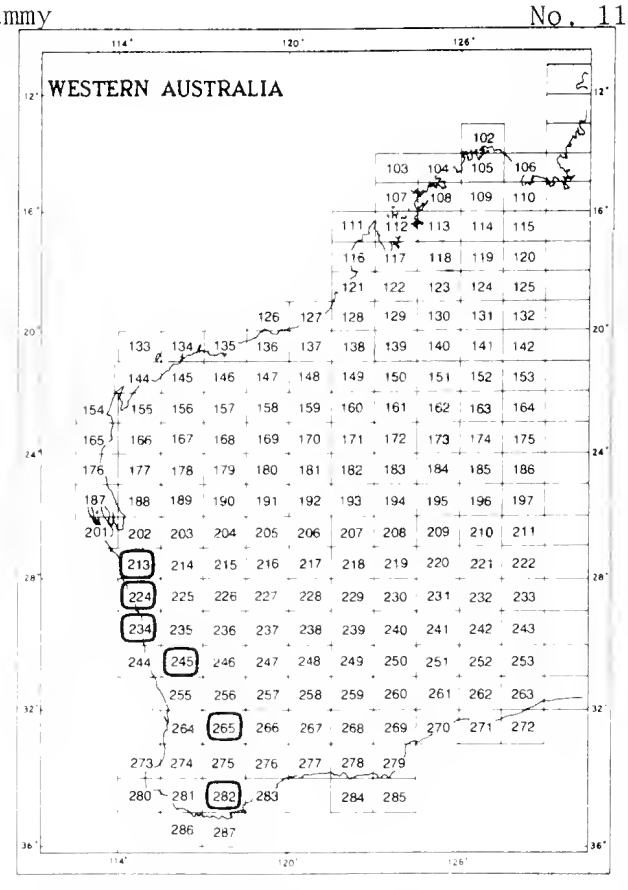
Parmelia reticulata Tayl. apud MacKay



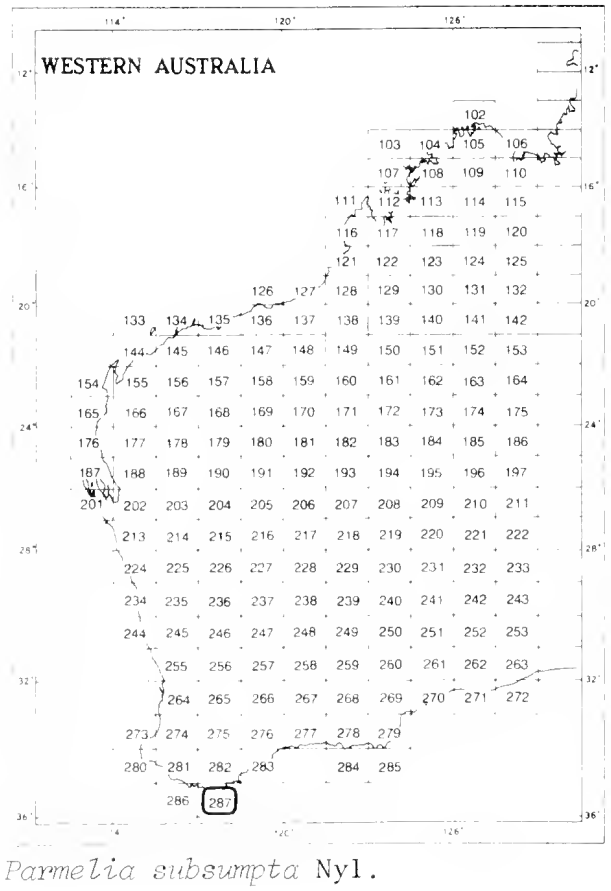
Parmelia rutidota Hook.f. & Tayl.



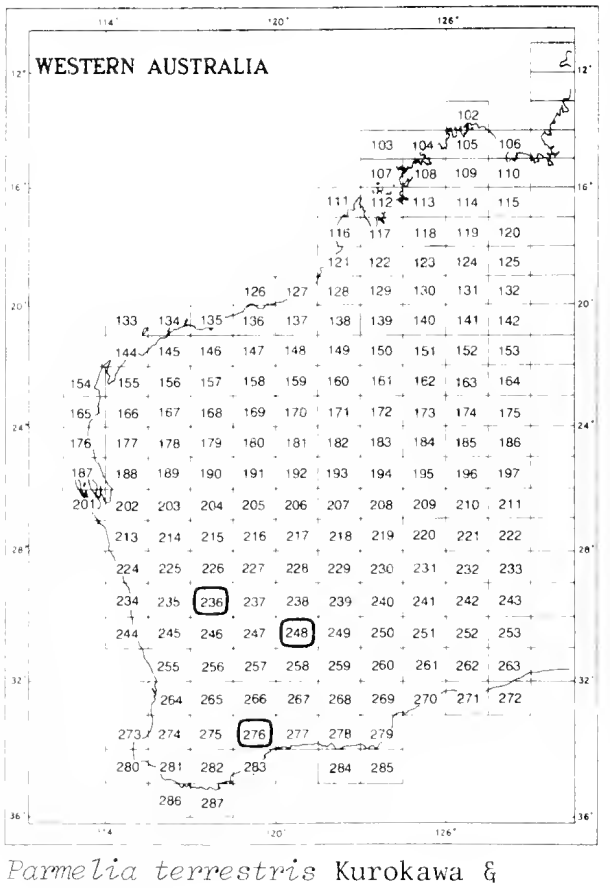
Parmelia scabrosa Tayl.



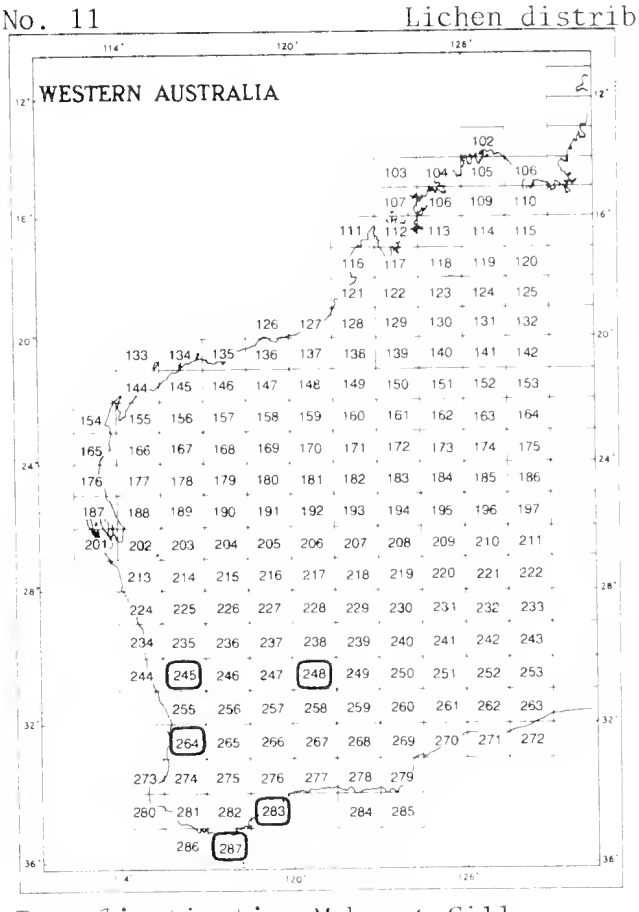
Parmelia subalbicans Stirt.



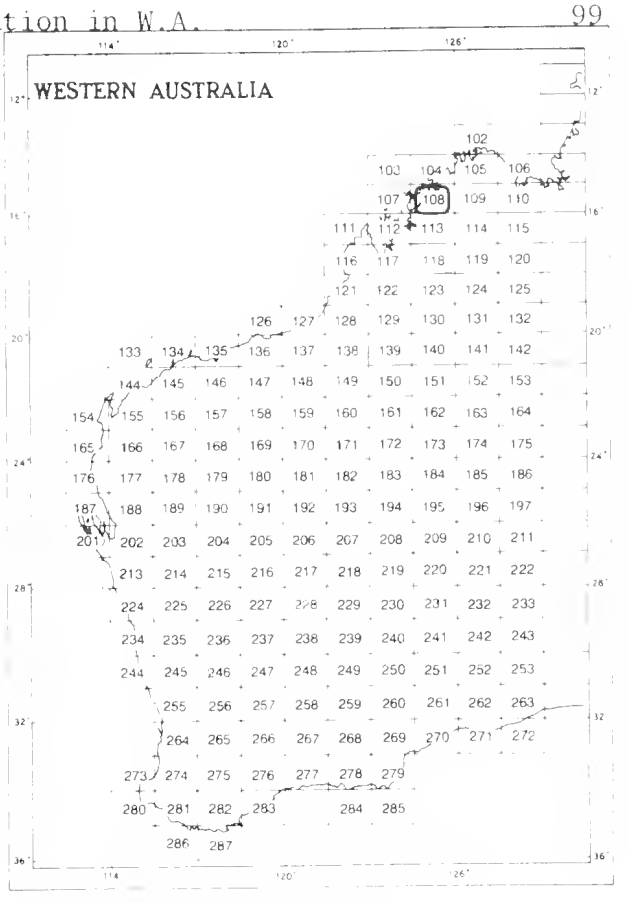
Parmelia subsumpta Nyl.



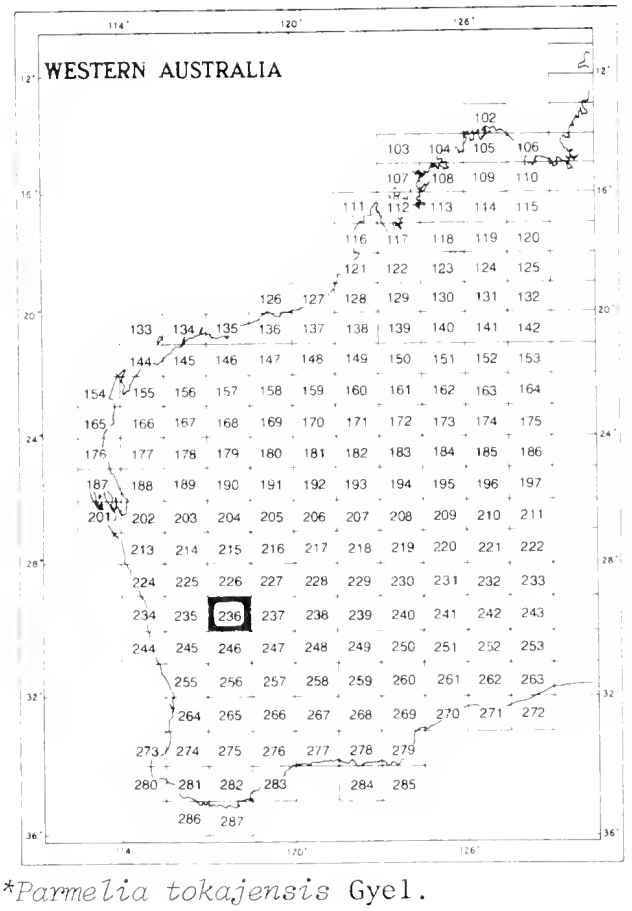
Parmelia terrestris Kurokawa & R.Filson



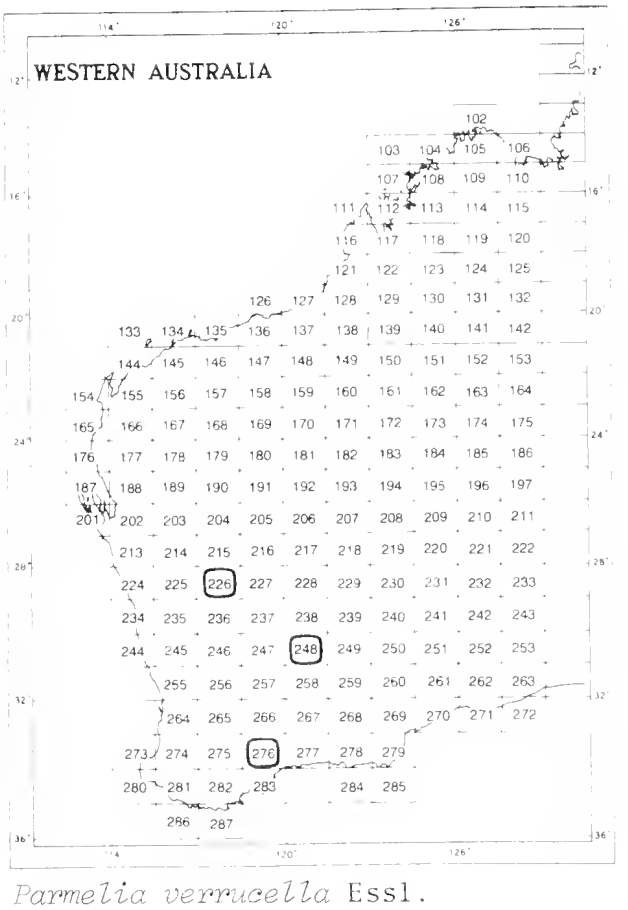
Parmelia tinctina Mah. et Gill.



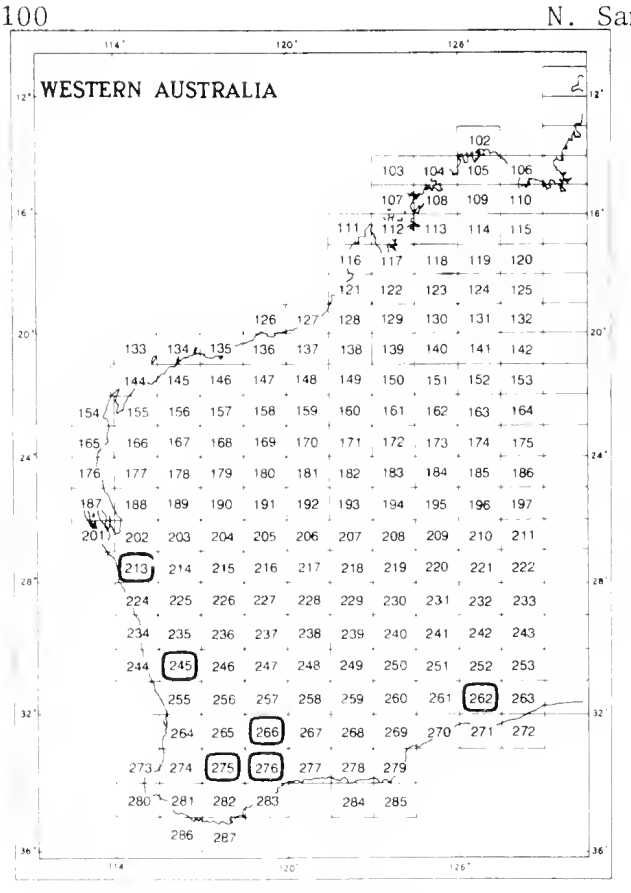
Parmelia tinctorum Nyl.



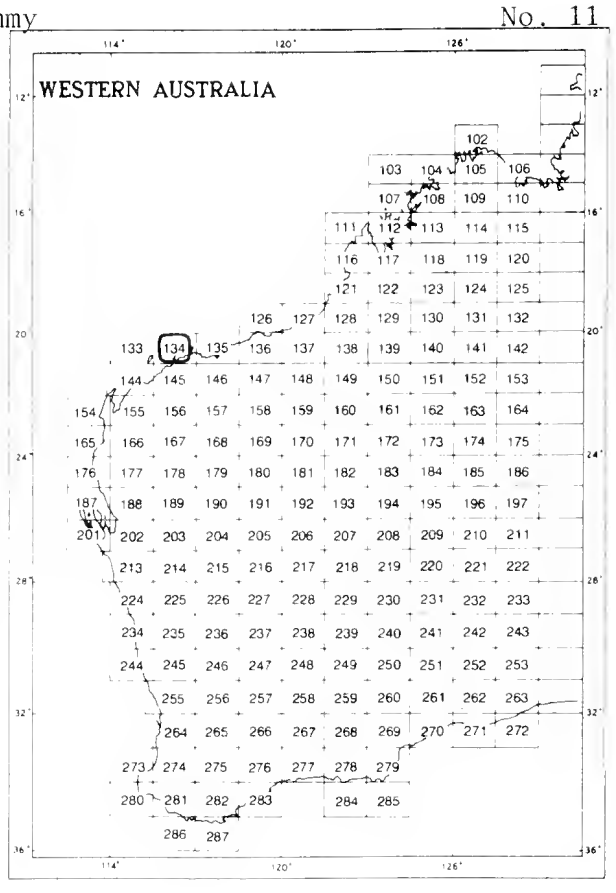
**Parmelia tokajensis* Gyel.



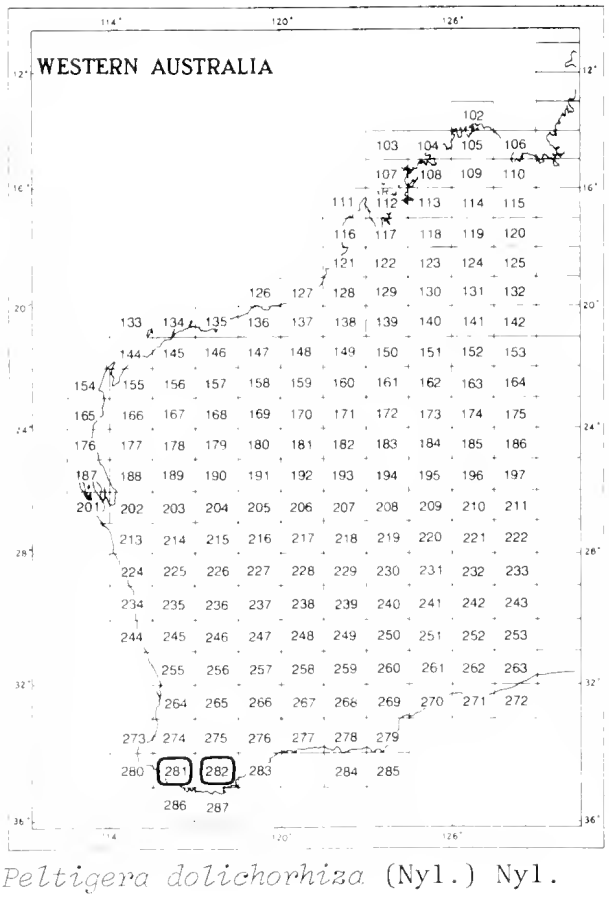
Parmelia verrucella Essl.



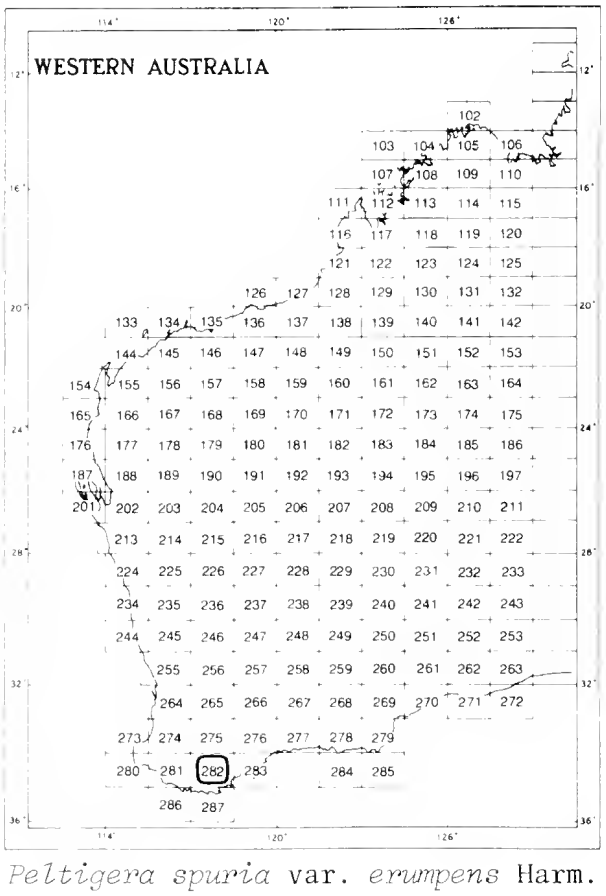
Parmelia willisii Kurokawa & R.Filson



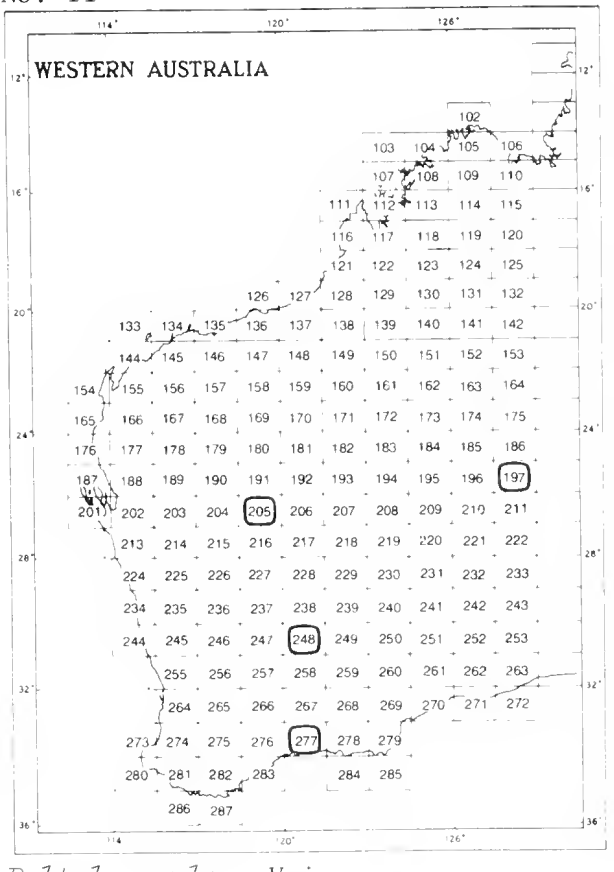
Peccania sp.



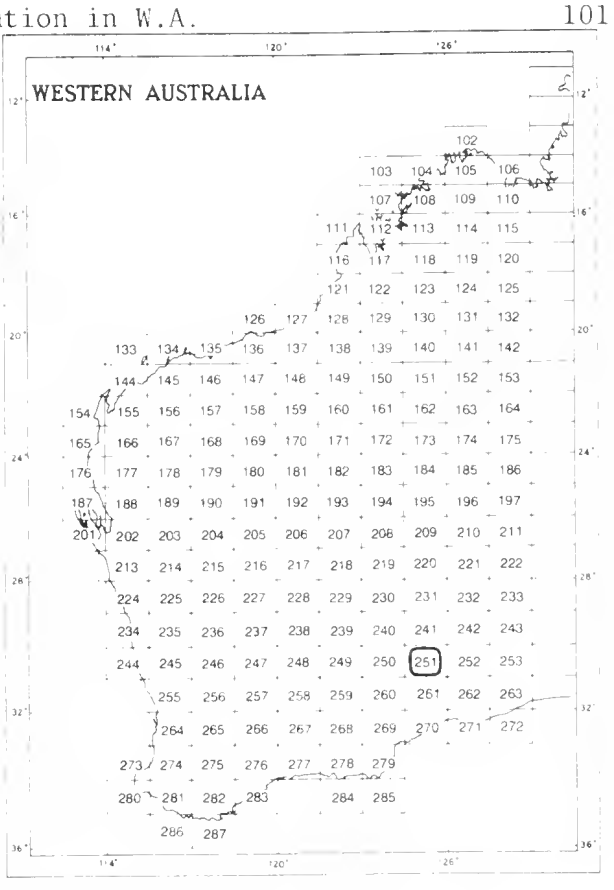
Peltigera dolichorhiza (Nyl.) Nyl.



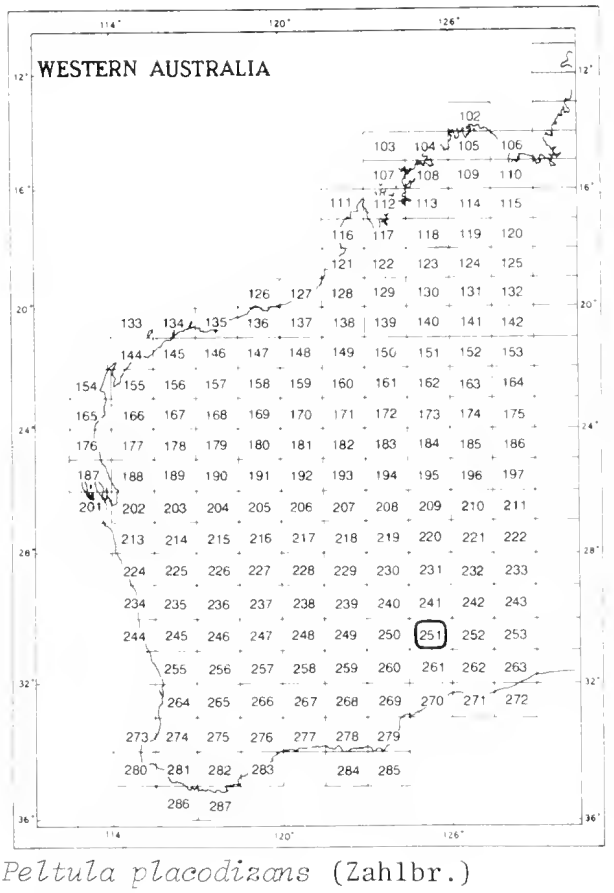
Peltigera spuria var. *erumpens* Harm.



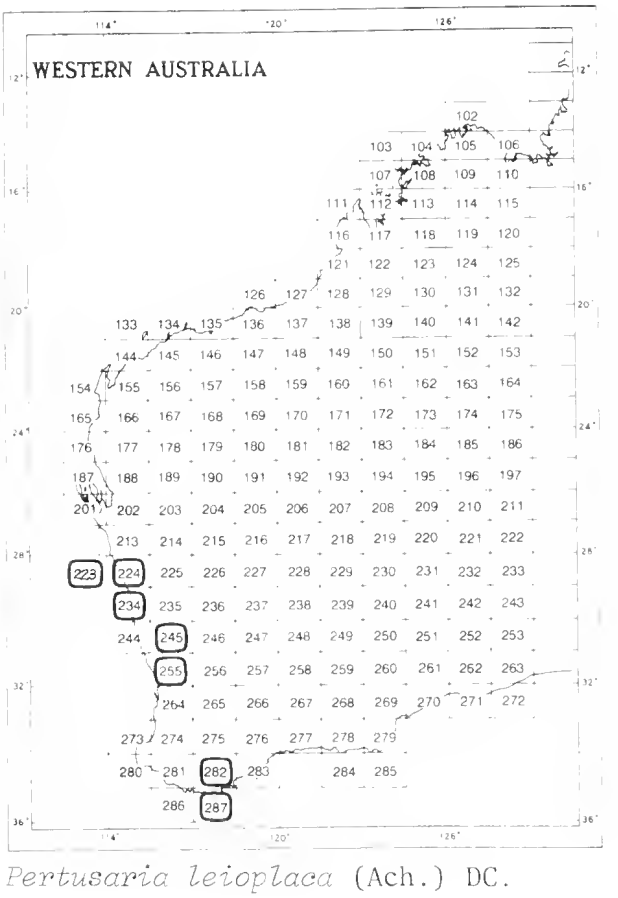
Peltula euploca Vain.



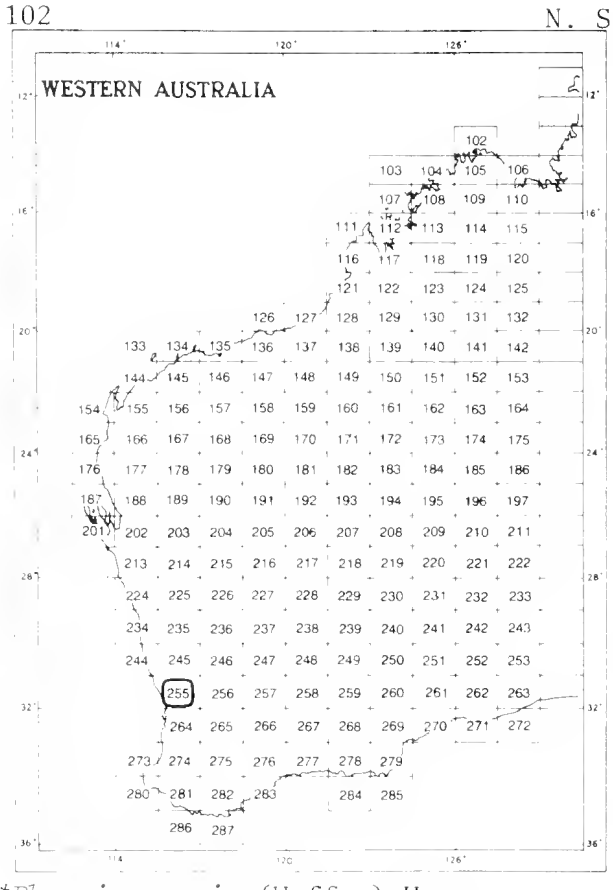
Peltula omphaliza (Nyl. in Eckf.) Wetmore



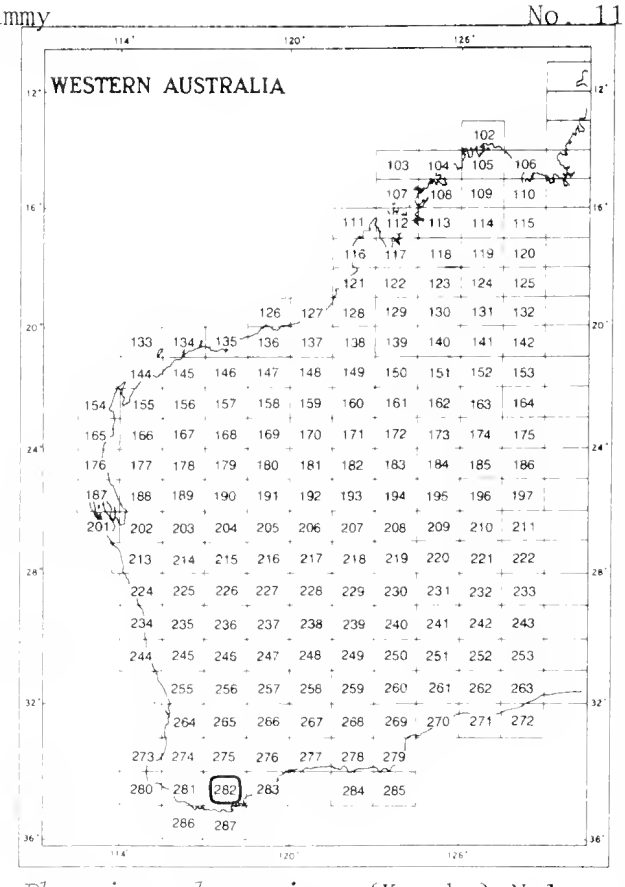
Peltula placodizans (Zahlbr.) Wetmore



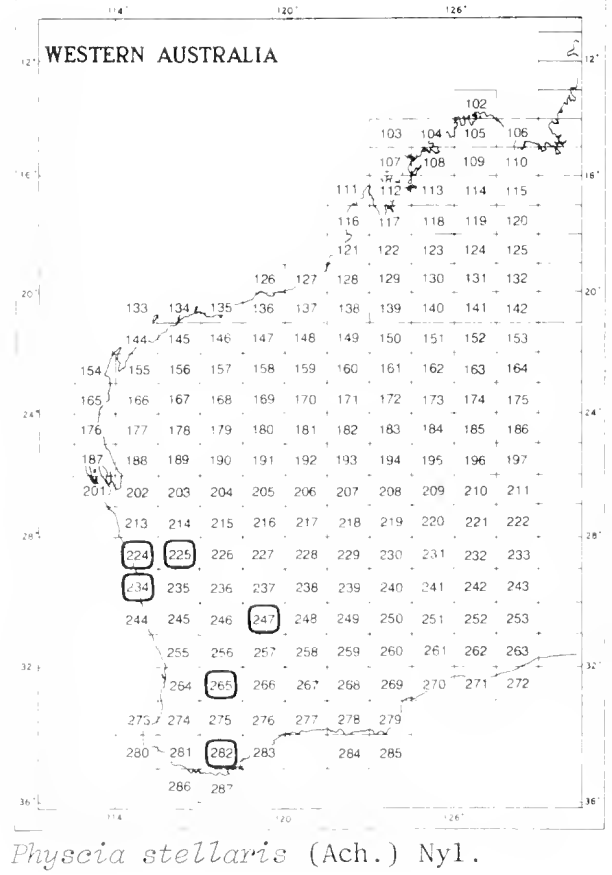
Pertusaria leioplaca (Ach.) DC.



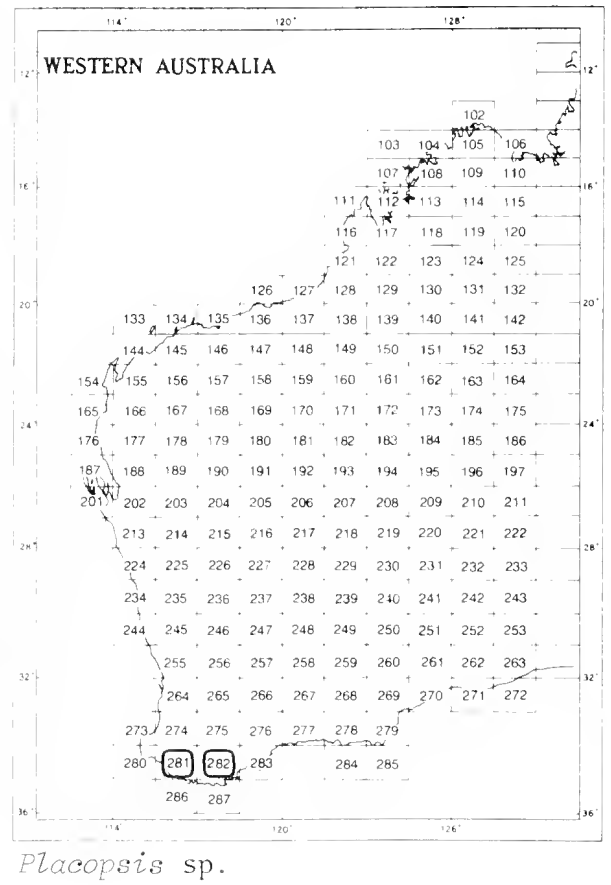
Physcia caesia (Hoffm.) Hampe



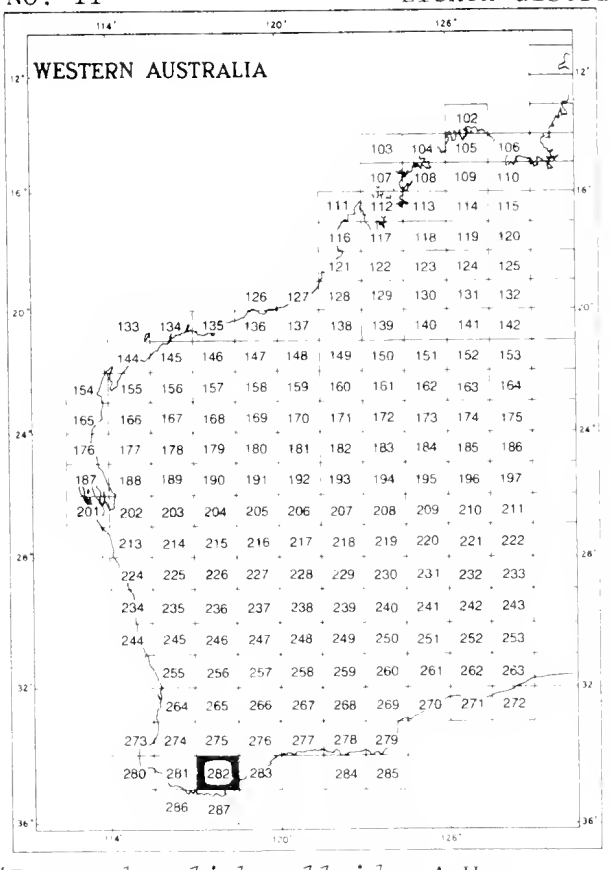
Physcia endococcinea (Koerb.) Nyl.



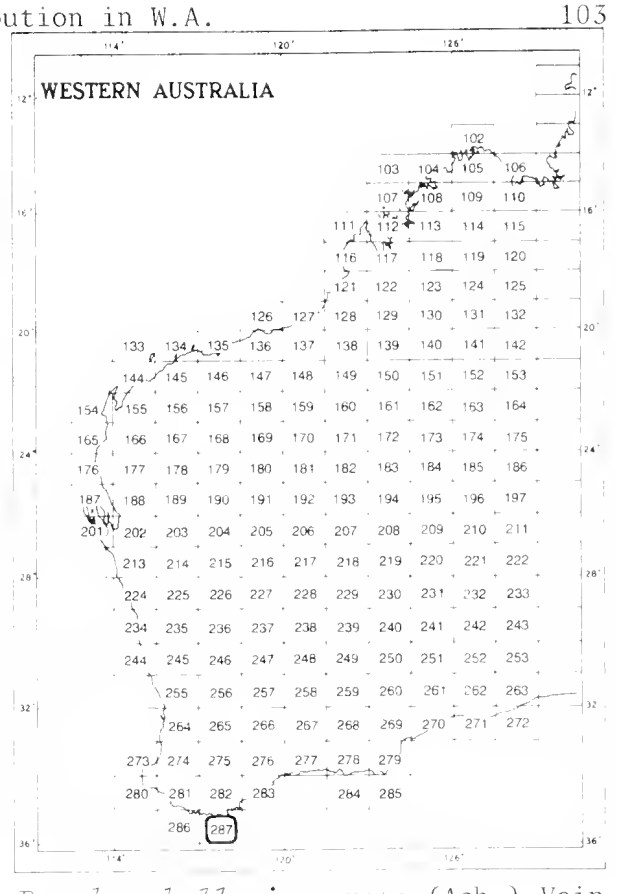
Physcia stellaris (Ach.) Nyl.



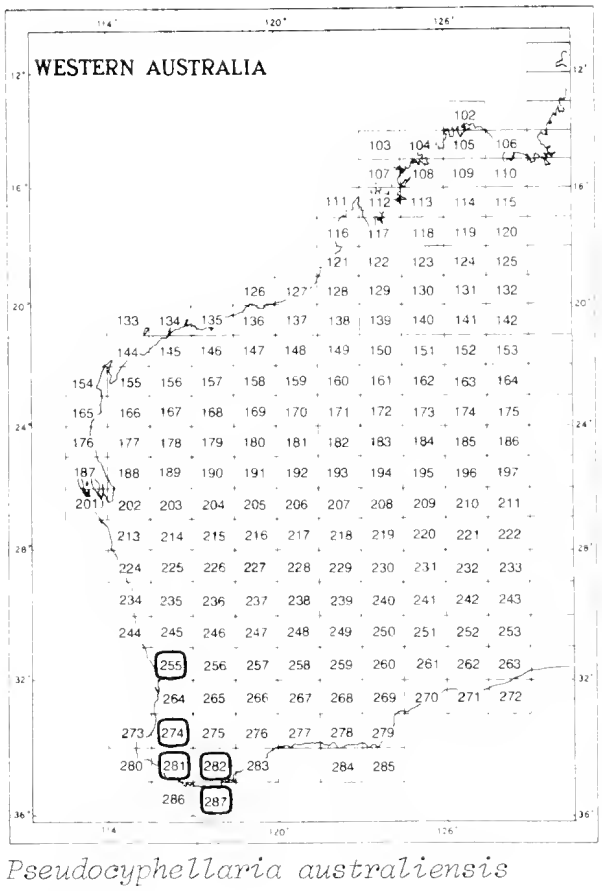
Placopsis sp.



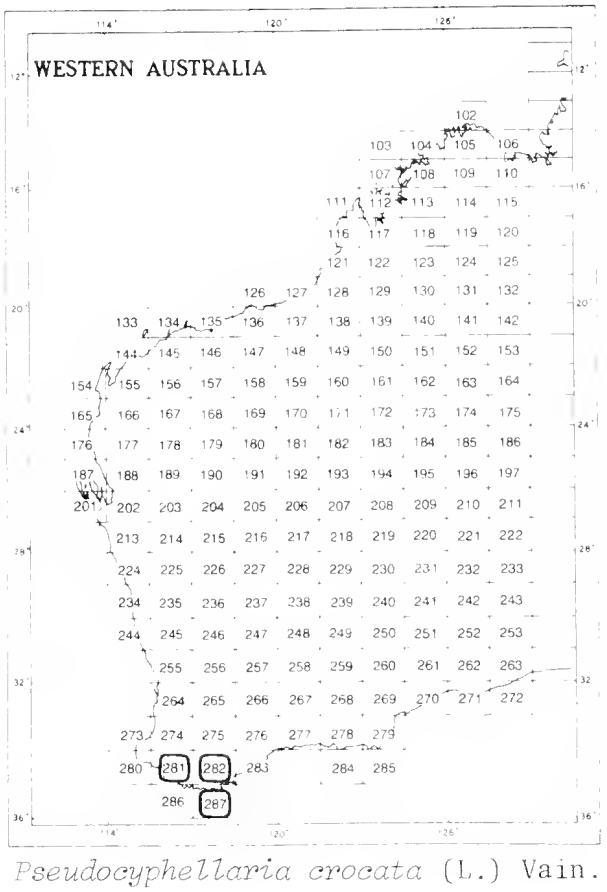
Porocyphus lichenelloides A.Henss.



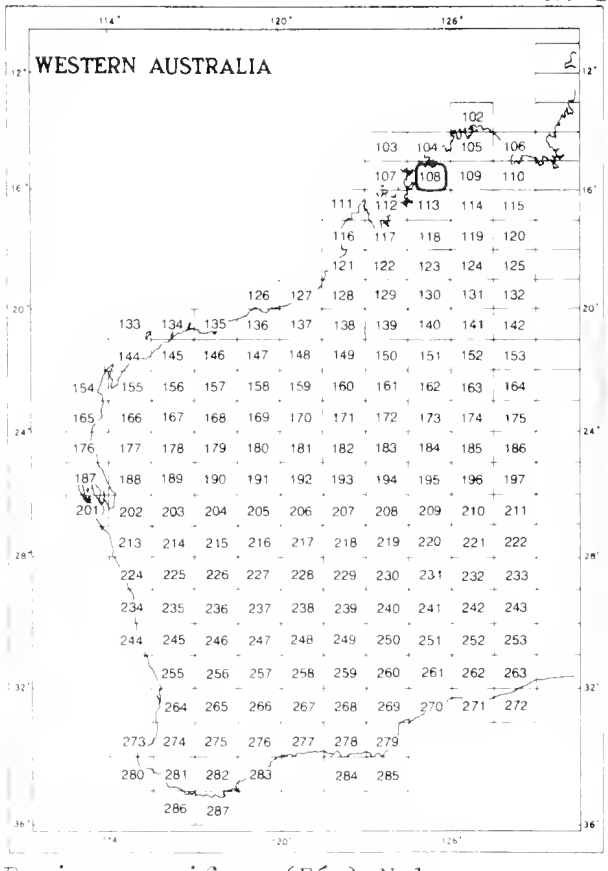
Pseudocyphellaria aurata (Ach.) Vain.



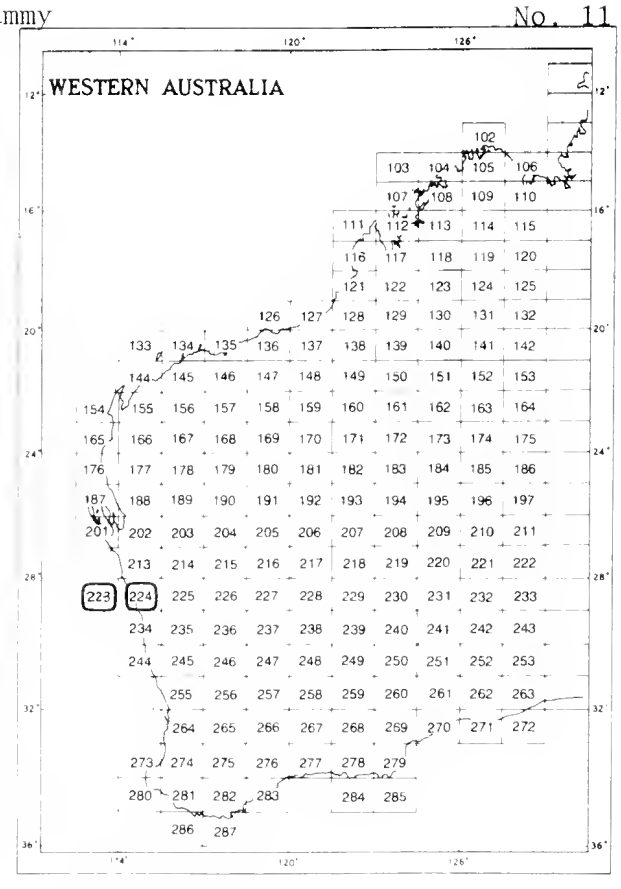
Pseudocyphellaria australiensis H. Magn.



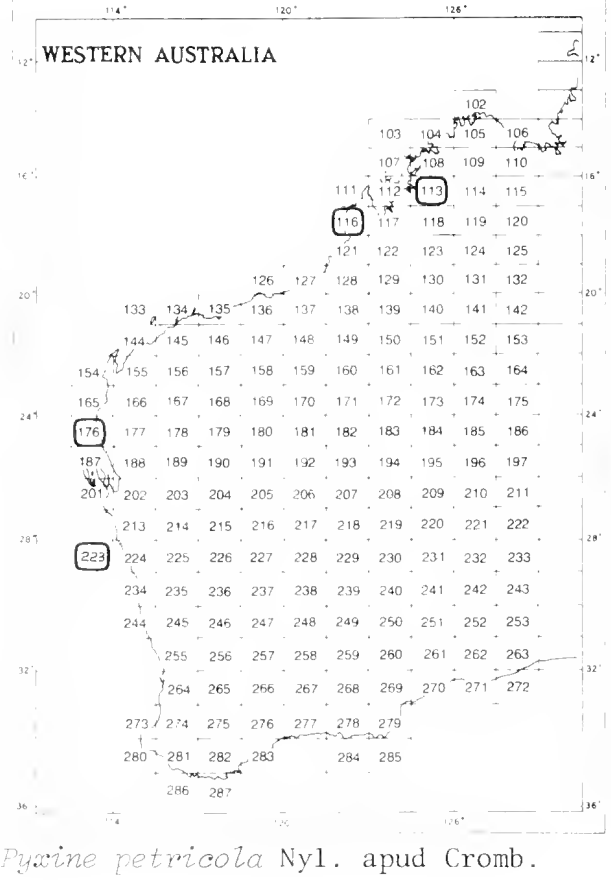
Pseudocyphellaria crocata (L.) Vain.



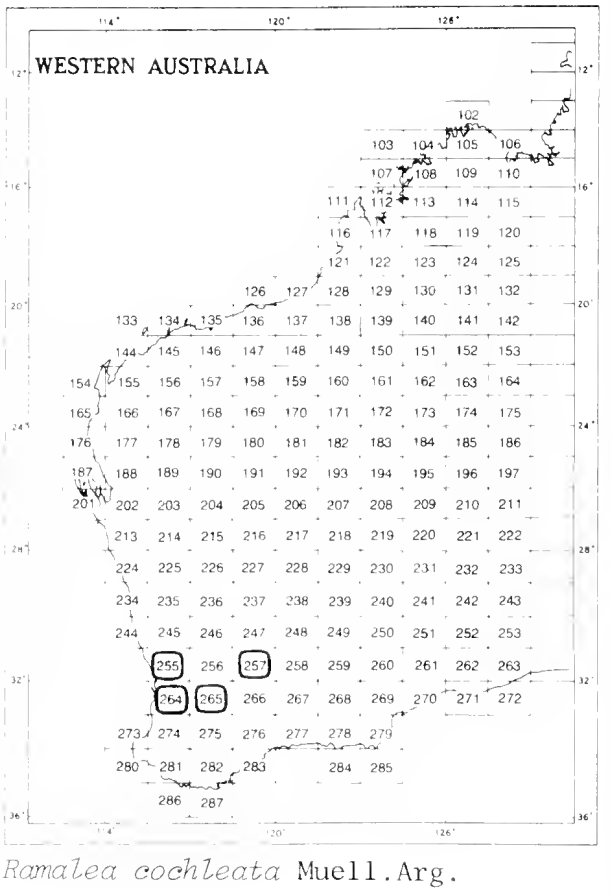
Pyxine coccifera (Fée) Nyl.



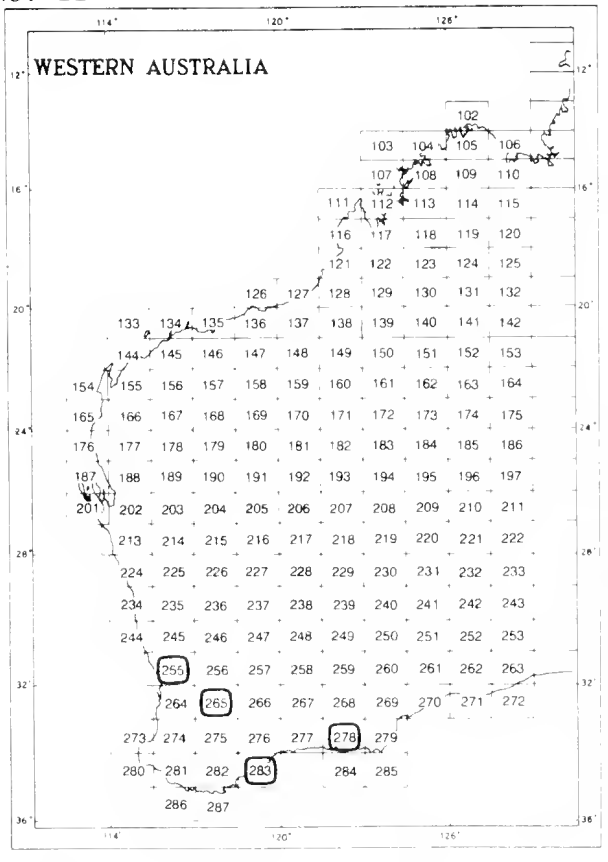
Pyxine cocoes (Sw.) Nyl.



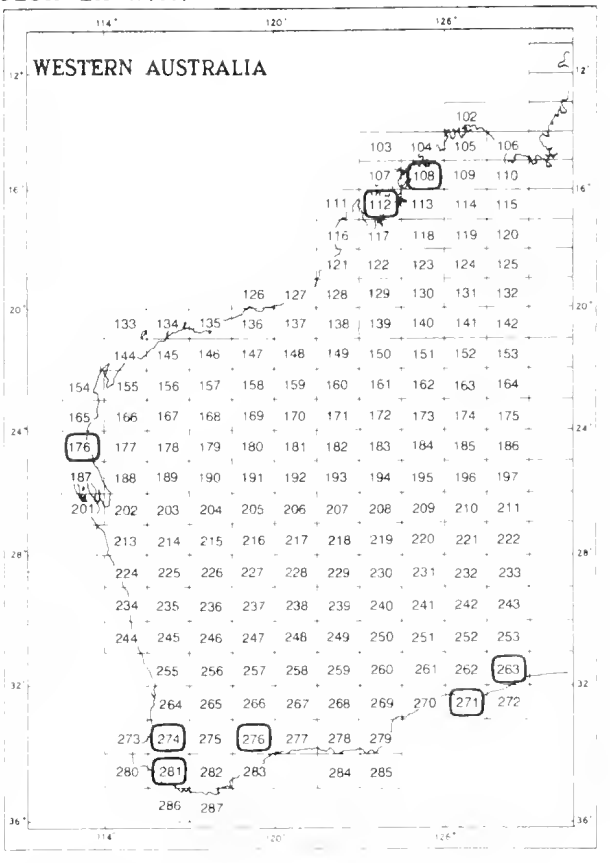
Pyxine petricola Nyl. apud Cromb.



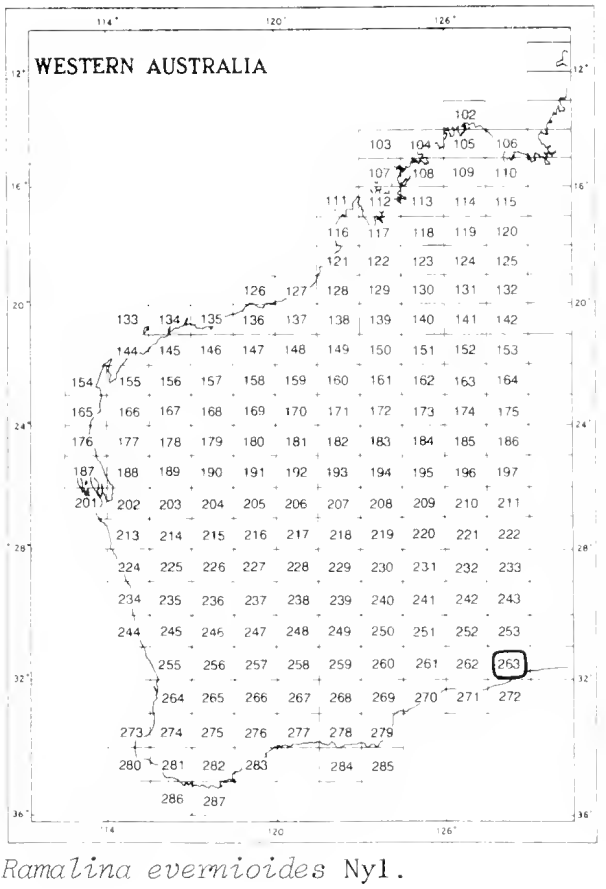
Ramalea cochleata Muell.Arg.



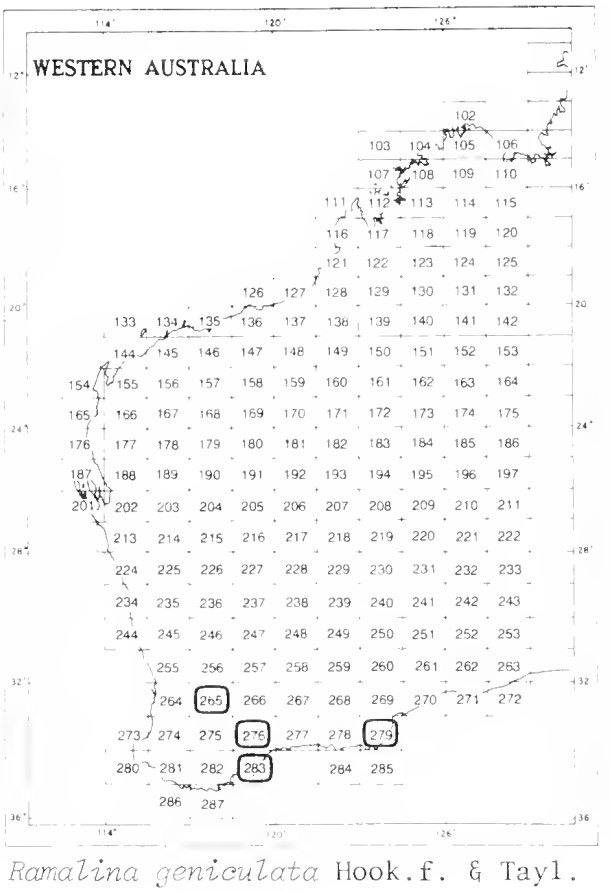
Ramalina calicaris (L.) Roehl.



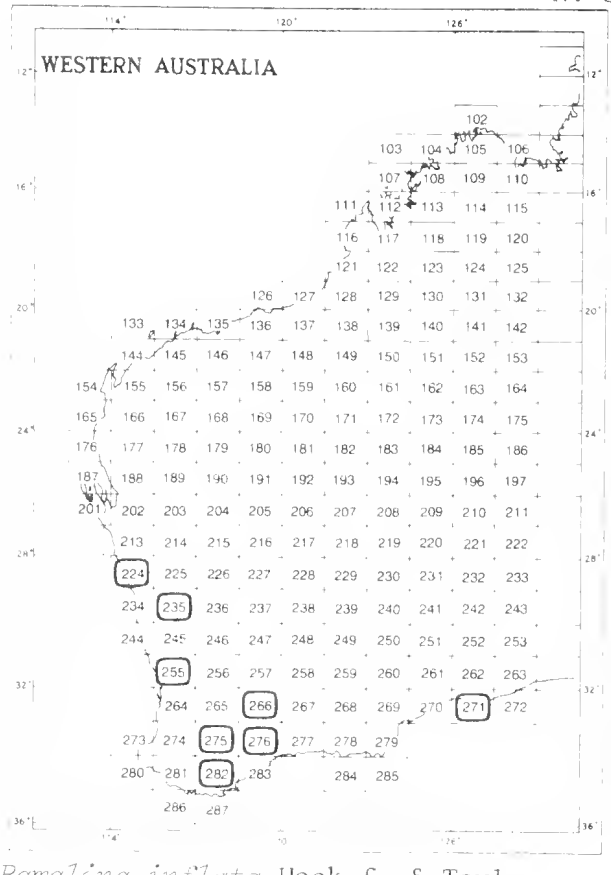
Ramalina celastri (Spreng.) Krog & Swinscow



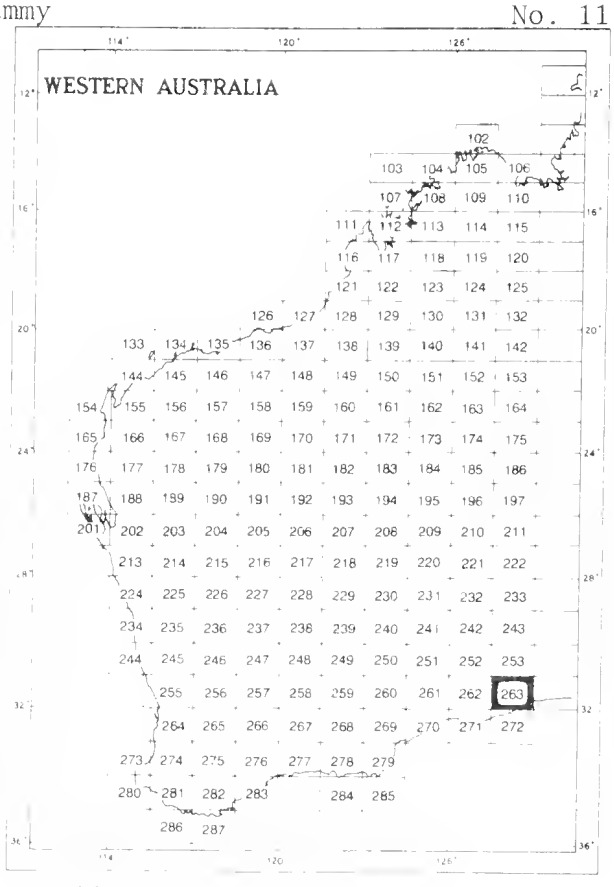
Ramalina evernioides Nyl.



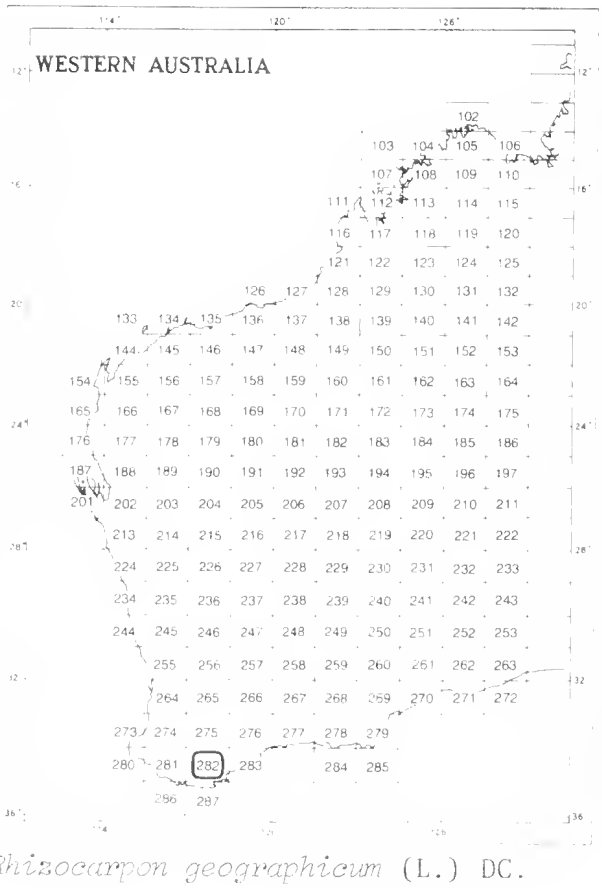
Ramalina geniculata Hook.f. & Tayl.



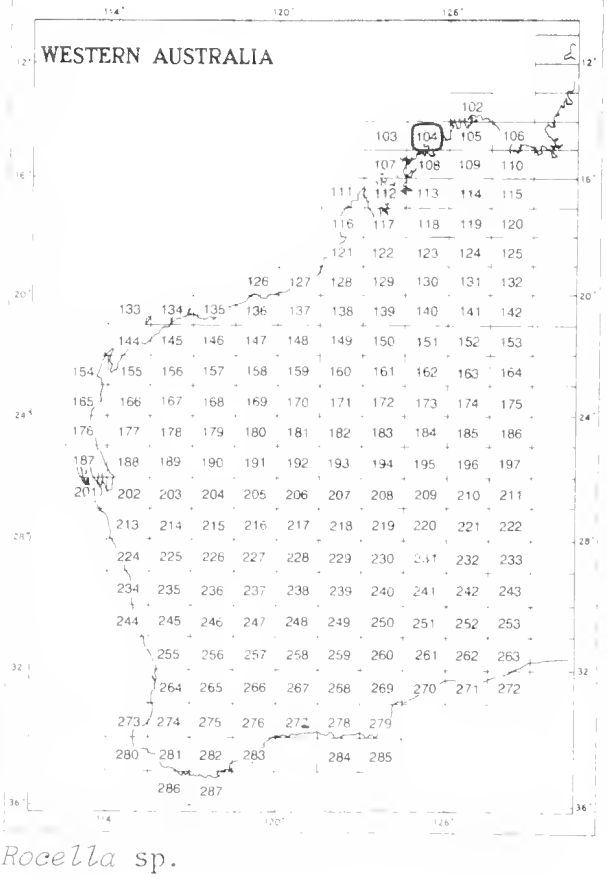
Ramalina inflata Hook.f. & Tayl.



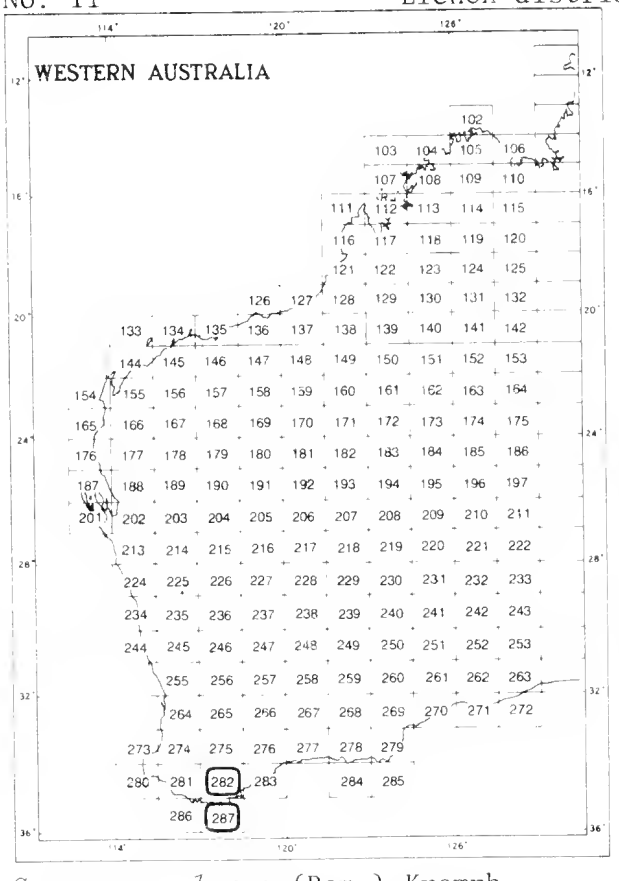
**Ramalina lacerata* Muell.Arg.



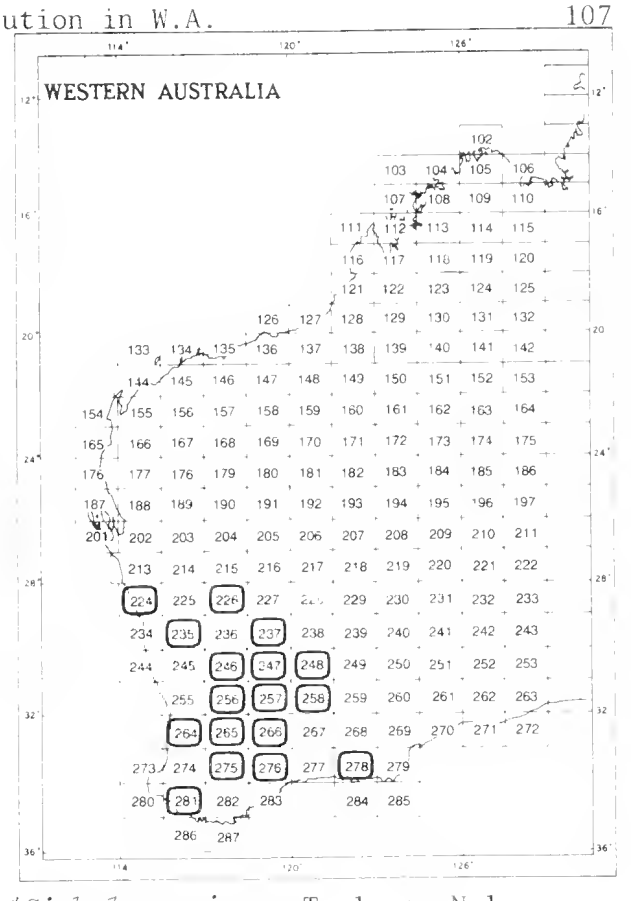
Rhizocarpon geographicum (L.) DC.



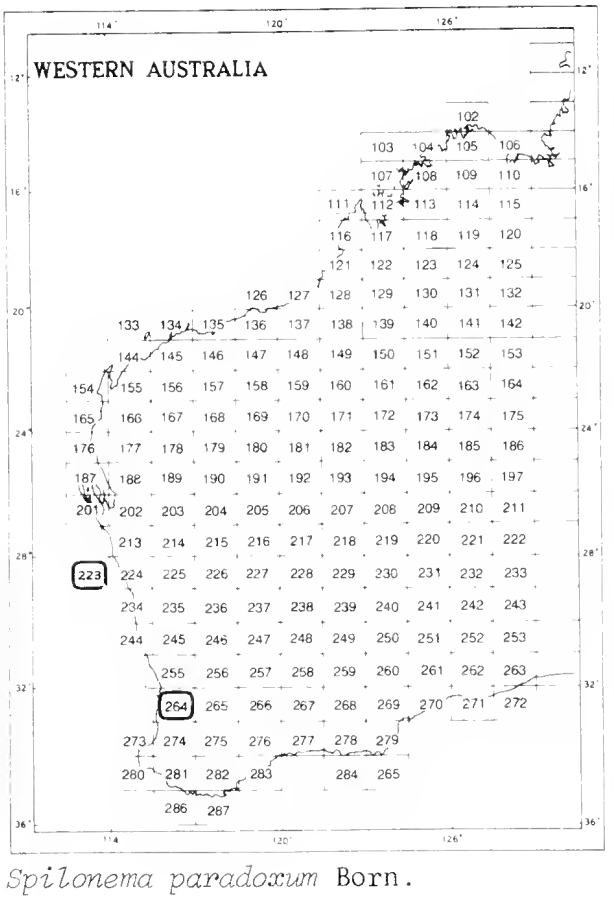
Rocella sp.



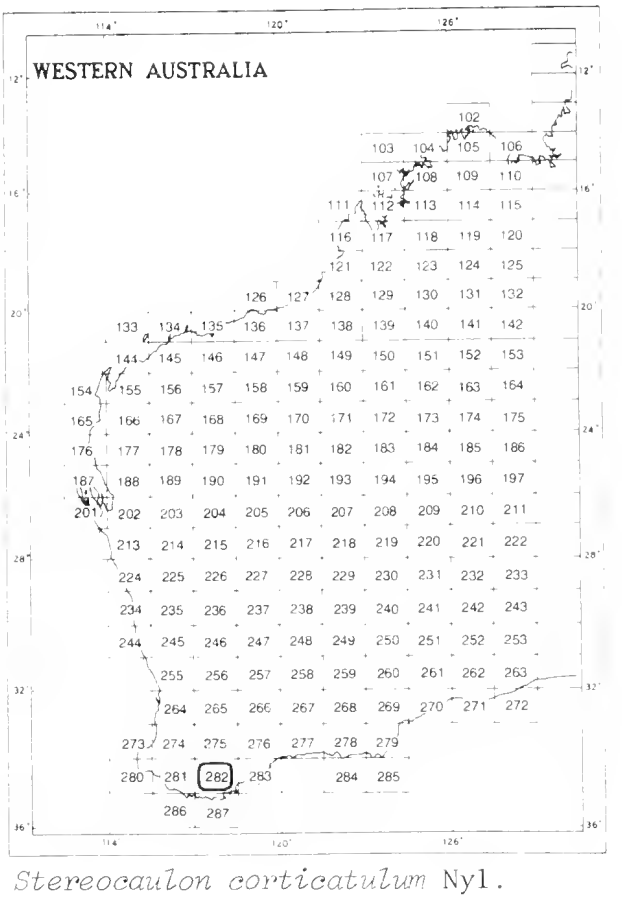
Sarcogyne clavus (Ram.) Kremph.



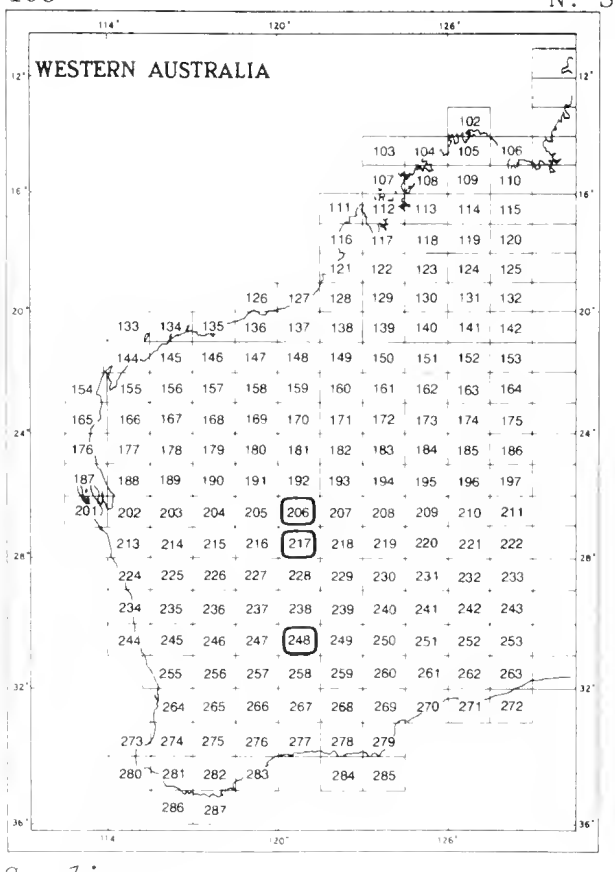
**Siphula coriacea* Tayl. ex Nyl.



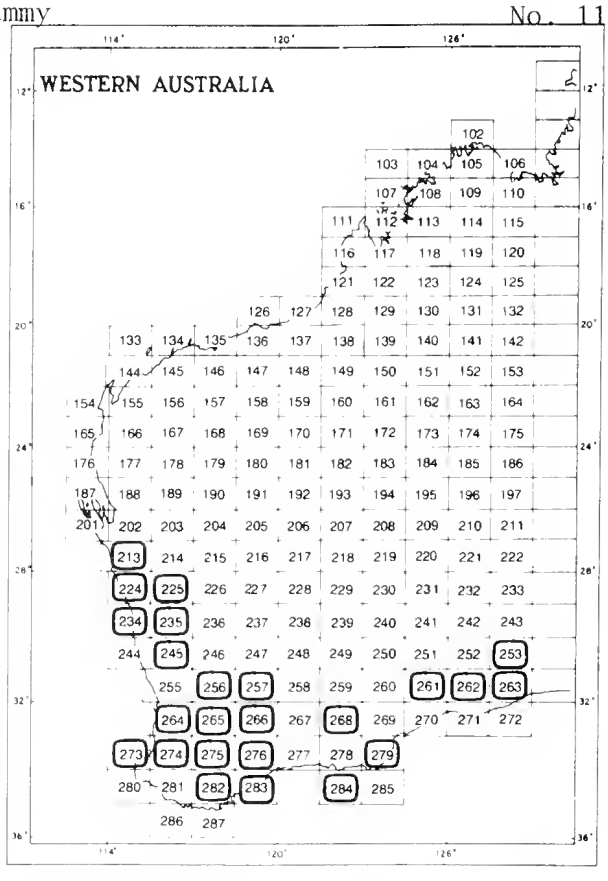
Spilonema paradoxum Born.



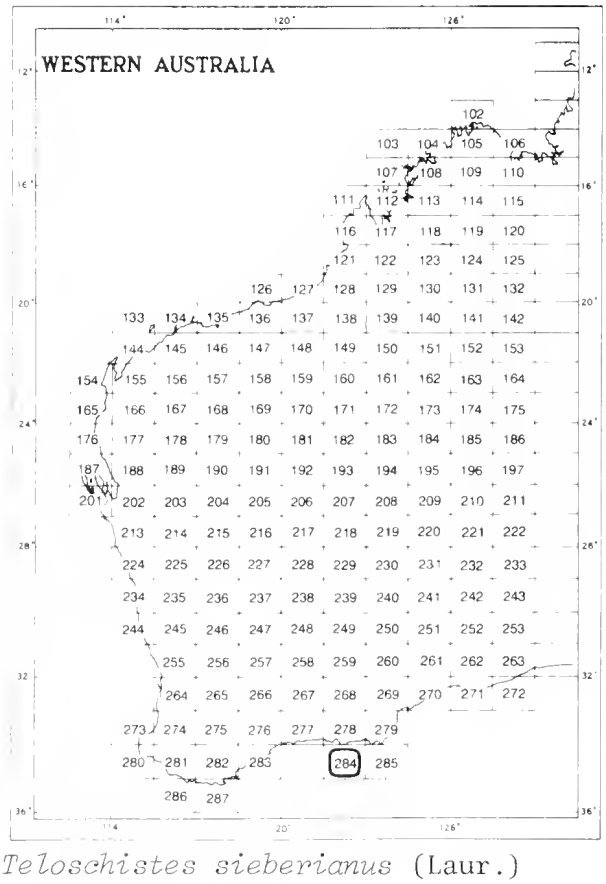
Stereocaulon corticatulum Nyl.



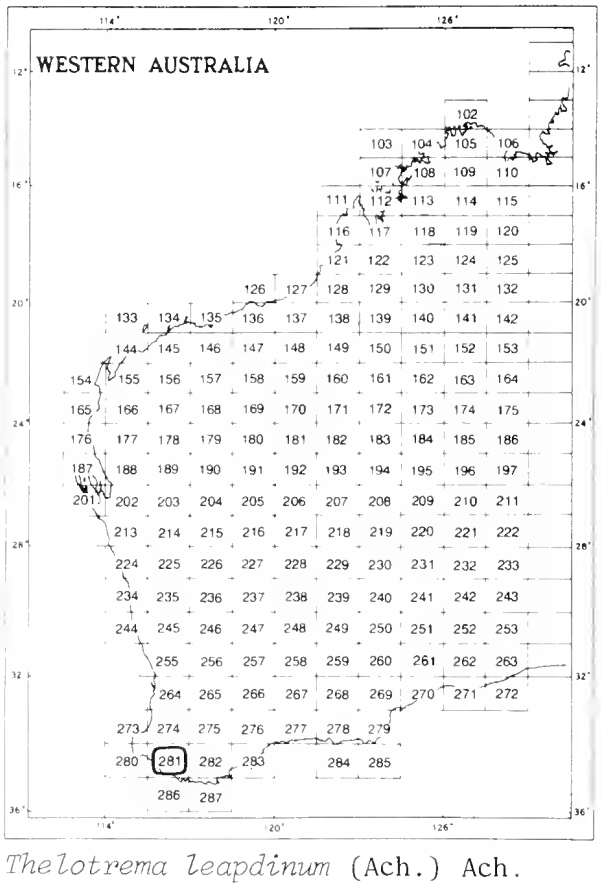
Synalissa sp.



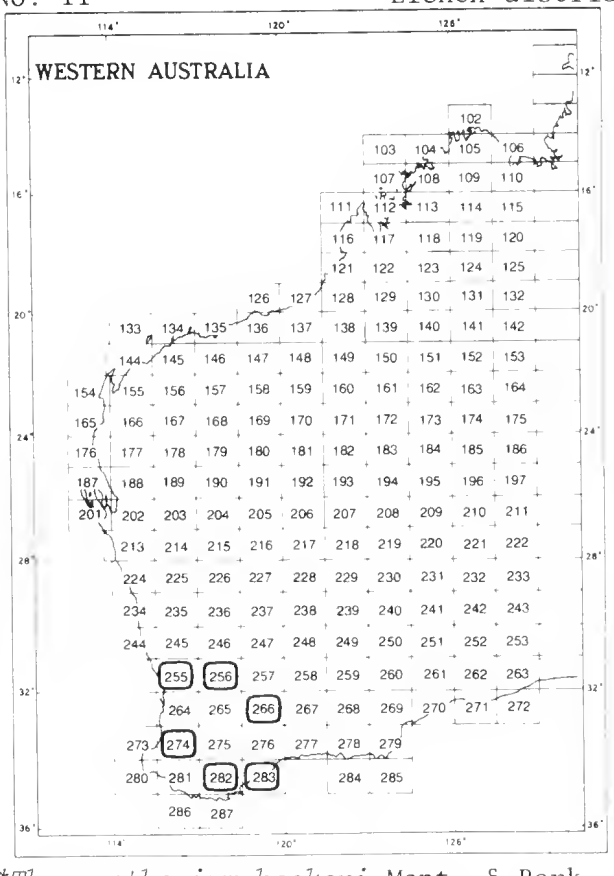
Teloschistes chrysopthalmus (L.) Beltr.



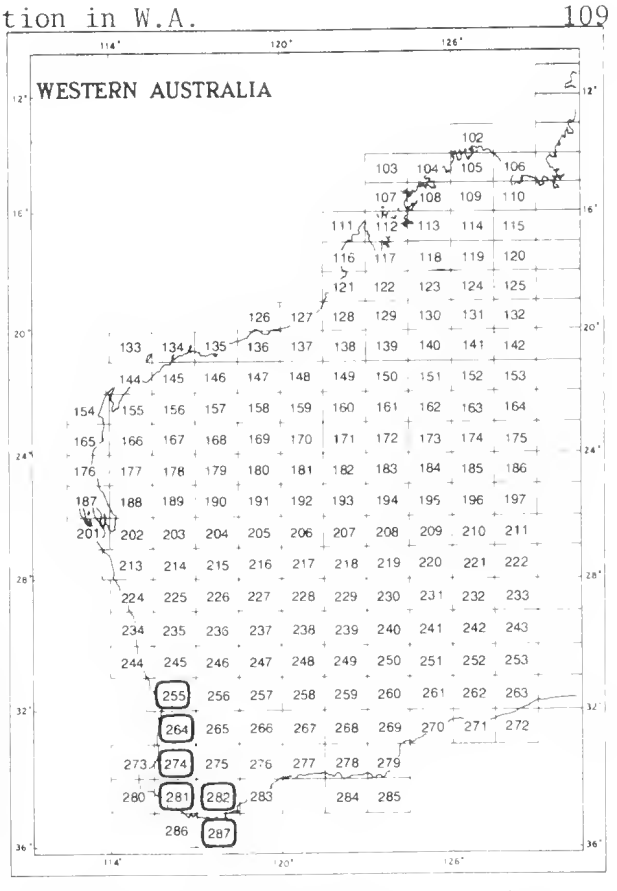
Teloschistes sieberianus (Laur.) Hillm.



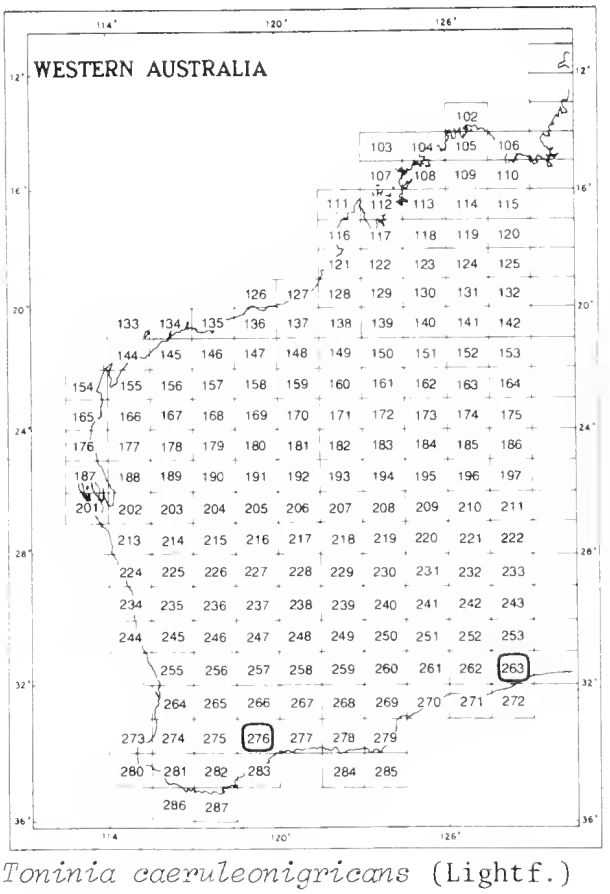
Thelotrema leapdinum (Ach.) Ach.



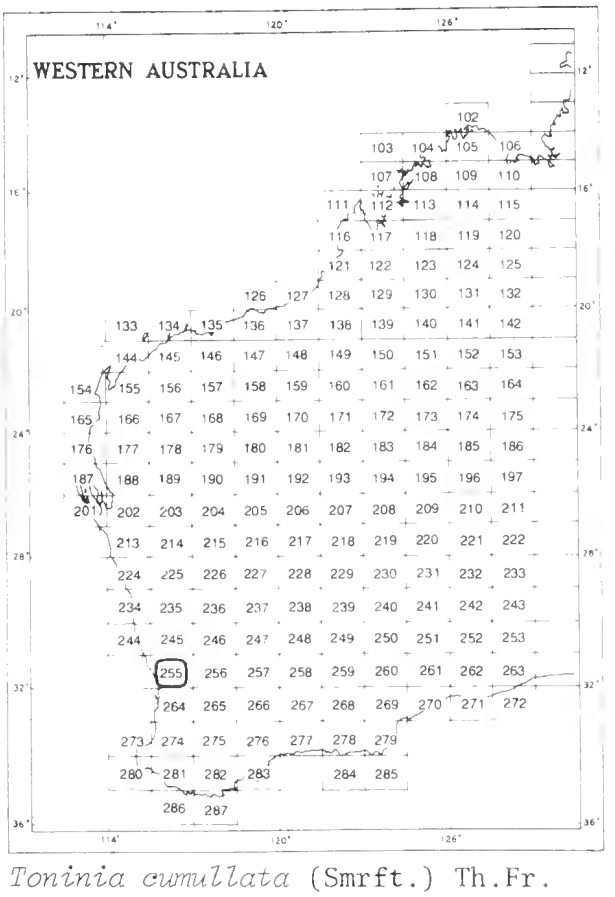
Thysanothecium hookeri Mont. & Berk.



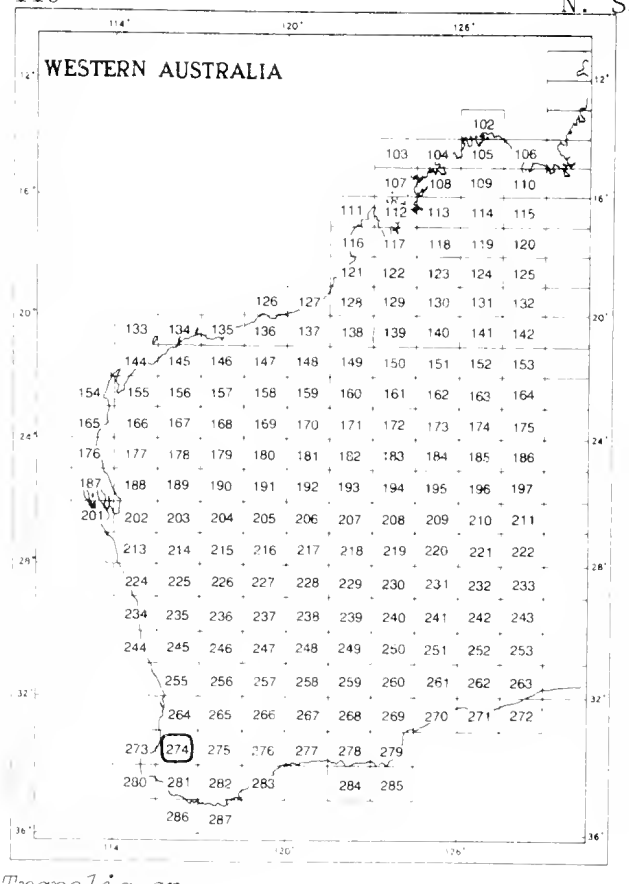
Thysanothecium hyalinum (Tayl.) Nyl.



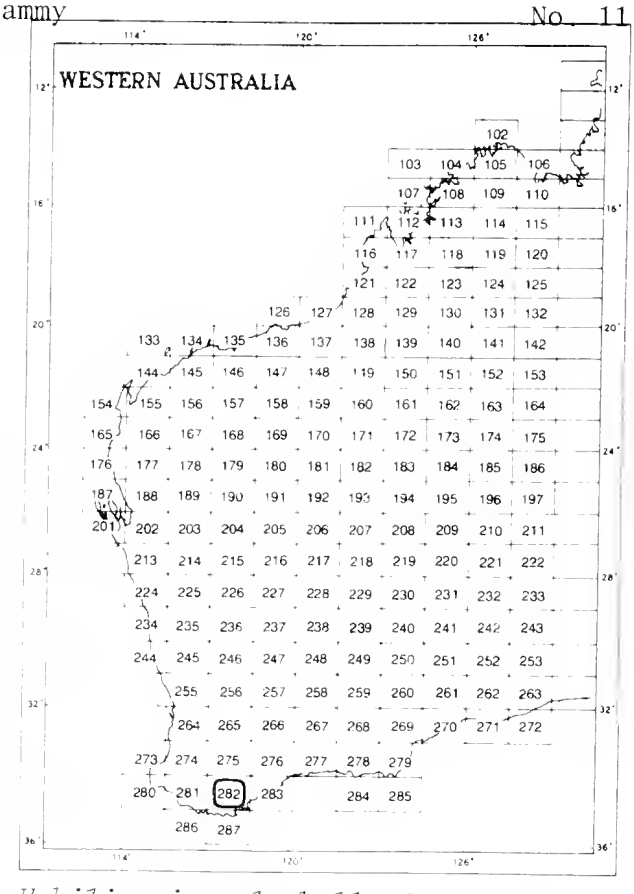
Toninia caeruleonigricans (Lightf.) Th.Fr.



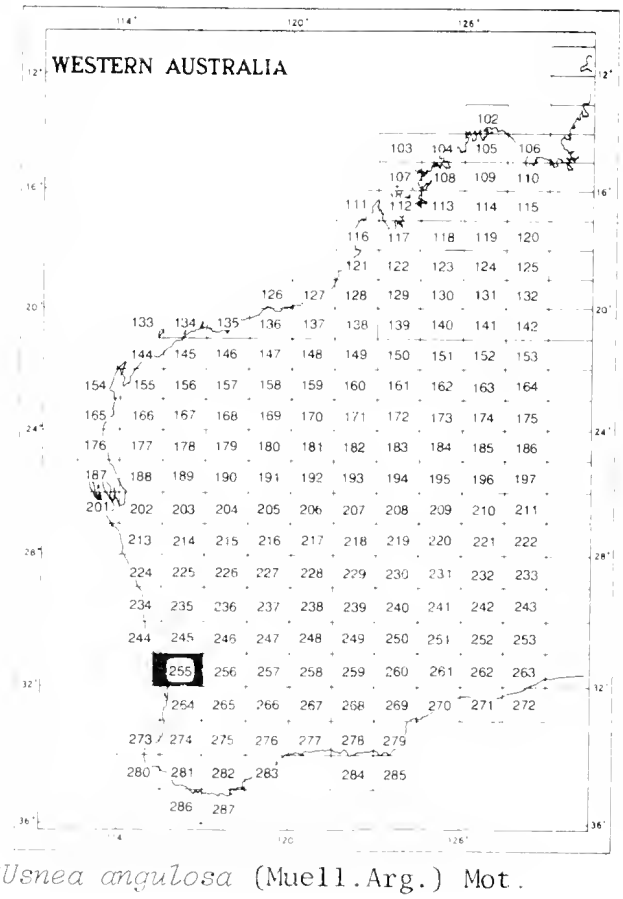
Toninia cumullata (Smrft.) Th.Fr.



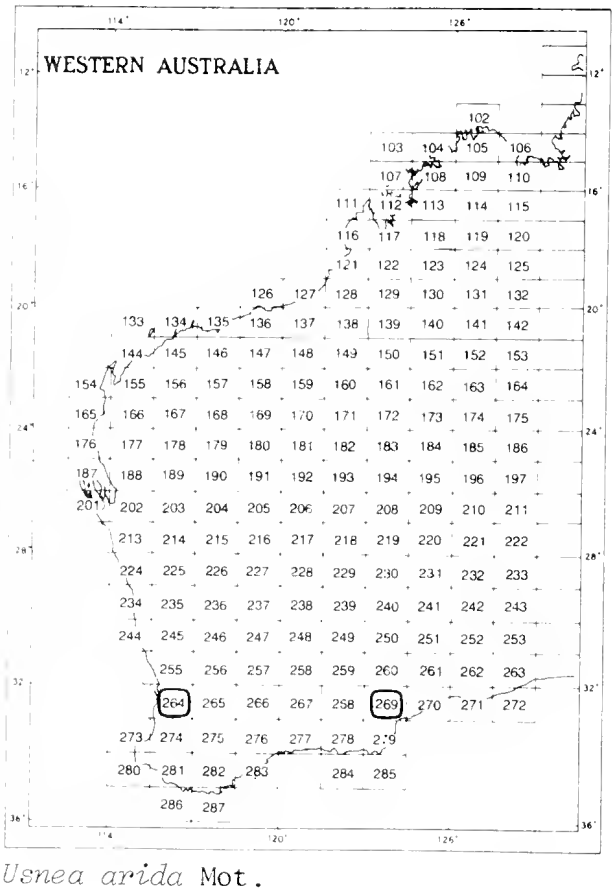
Trapelia sp.



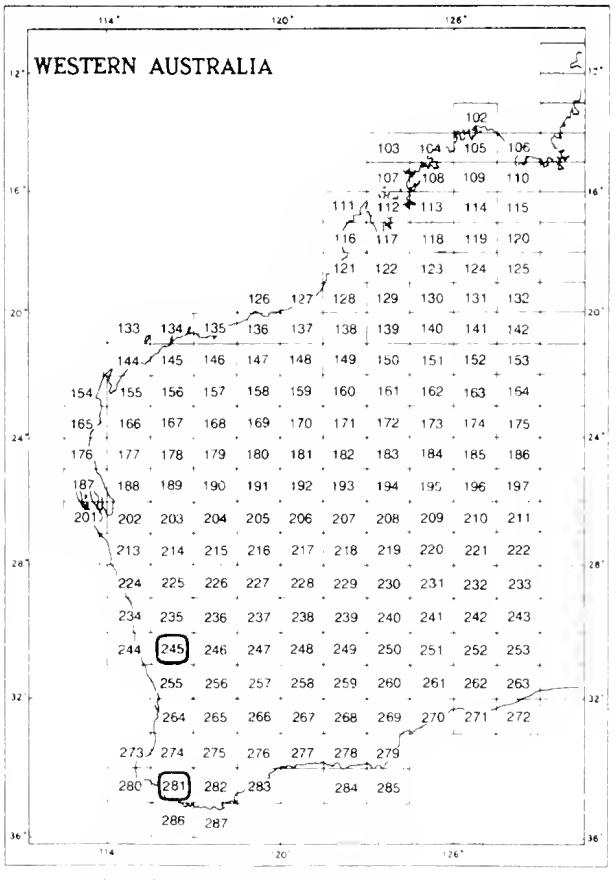
Umbilicaria polyphylla (L.) Baumg.



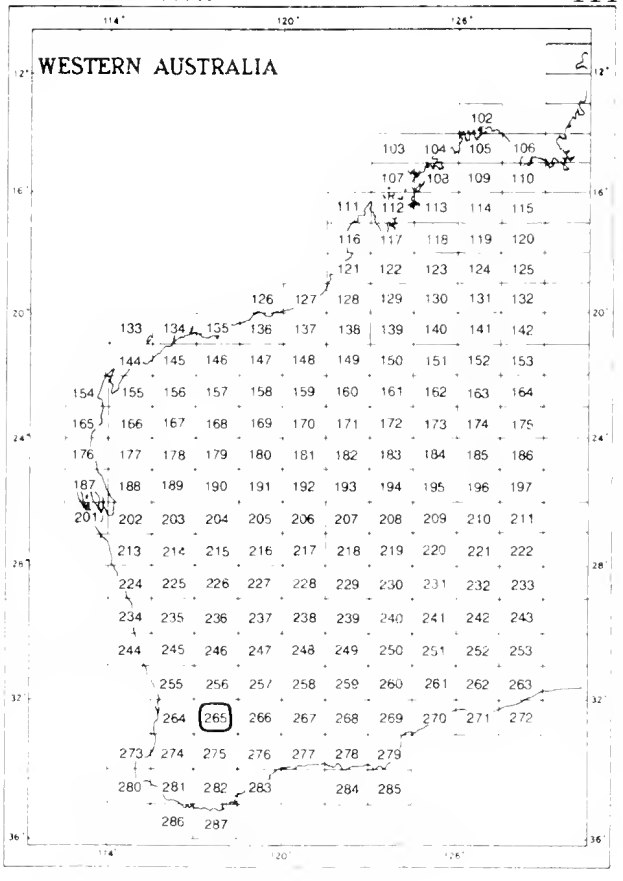
**Usnea angulosa* (Muell.Arg.) Mot.



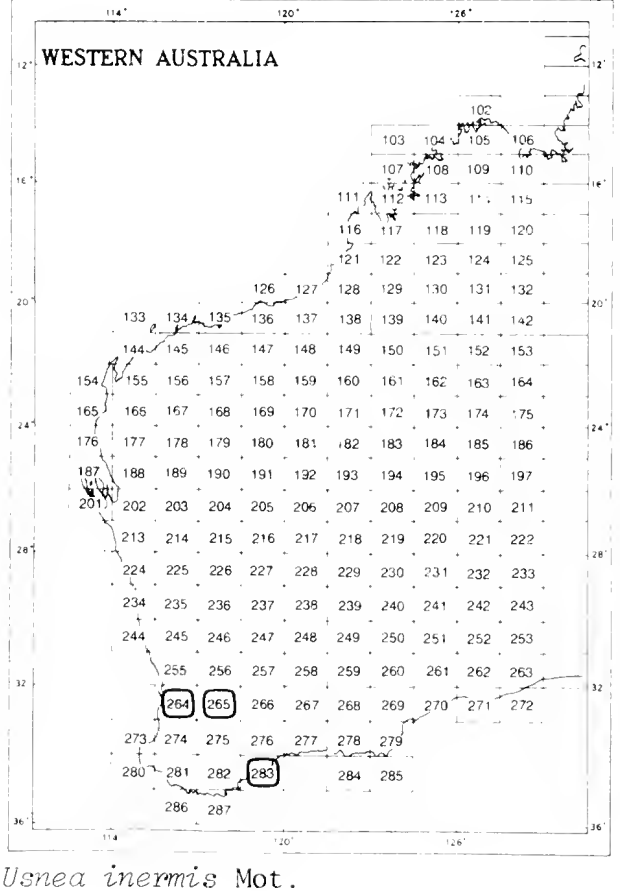
Usnea arida Mot.



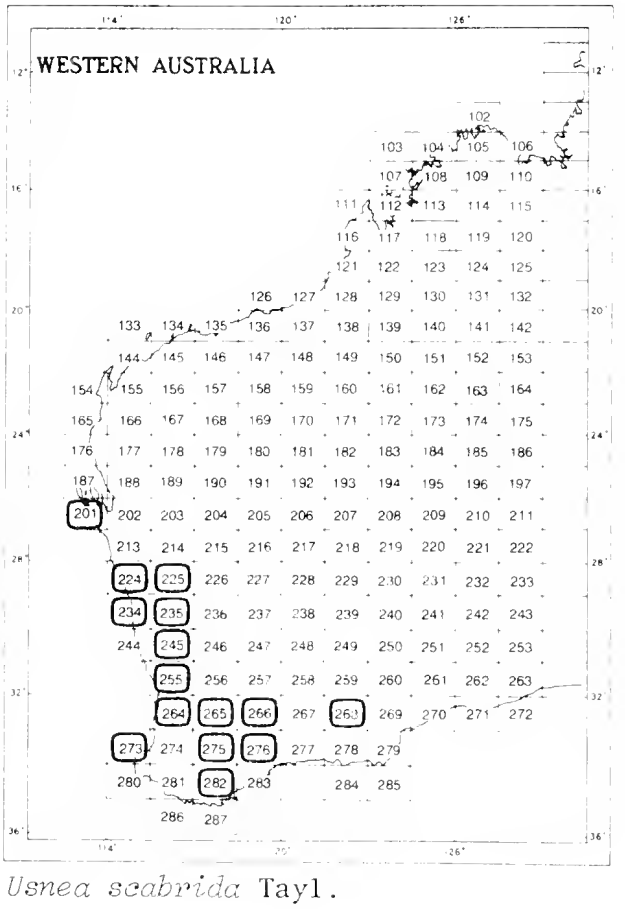
Usnea barbata (L.) Wigg.



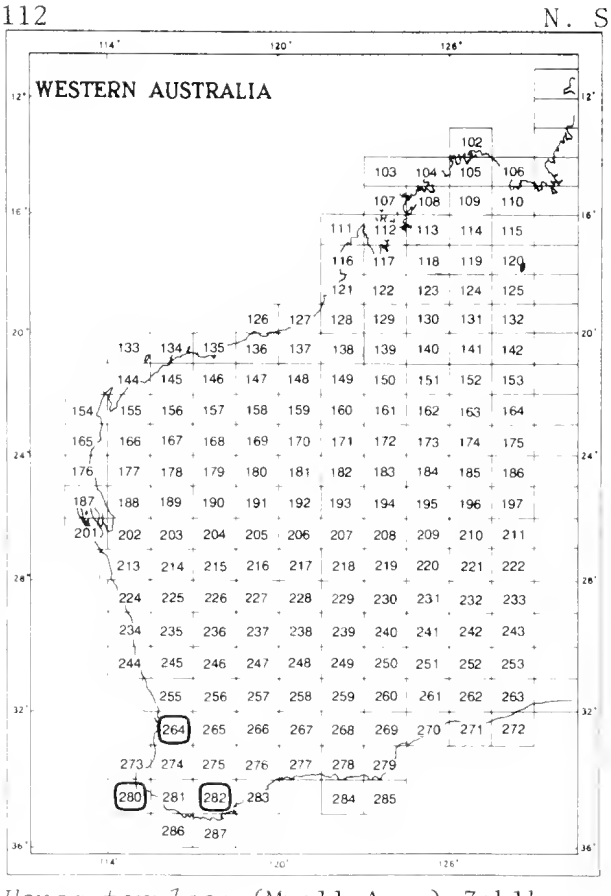
Usnea consimilis Stirt.



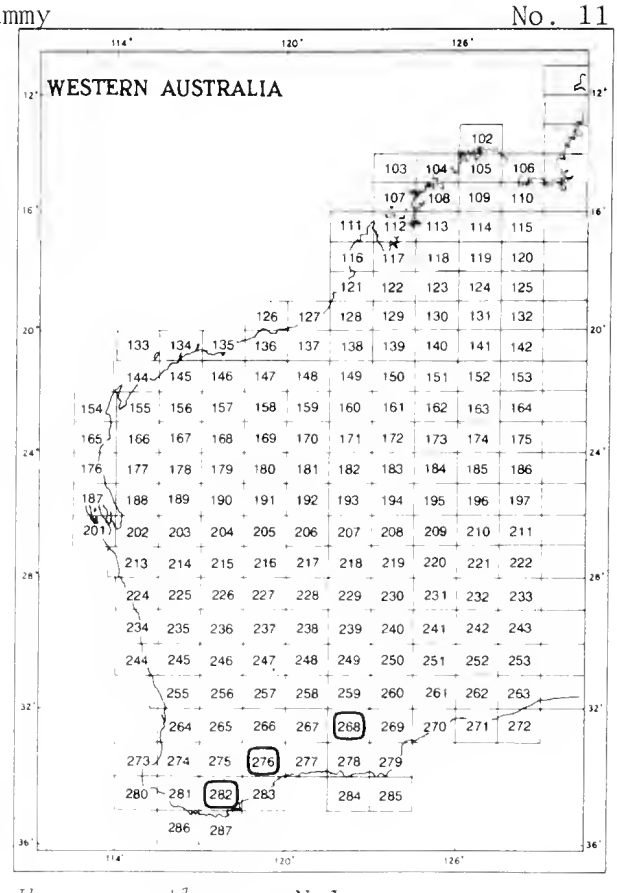
Usnea inermis Mot.



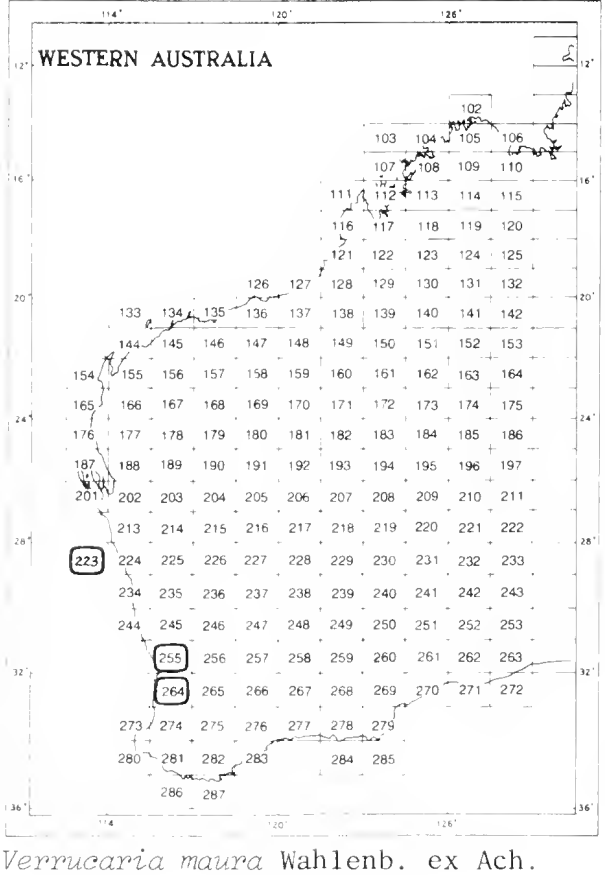
Usnea scabrida Tayl.



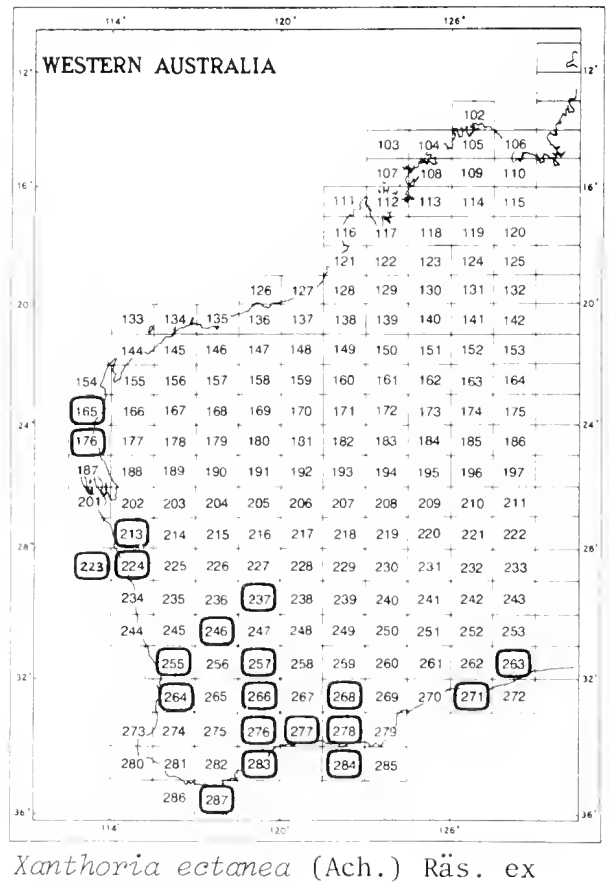
Usnea torulosa (Muell.Arg.) Zahlbr.



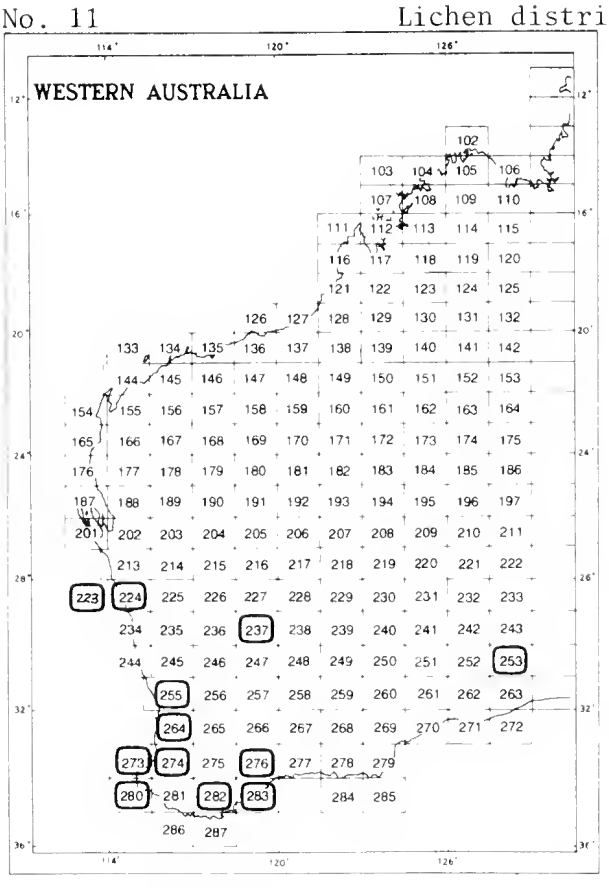
Usnea xanthopoga Nyl.

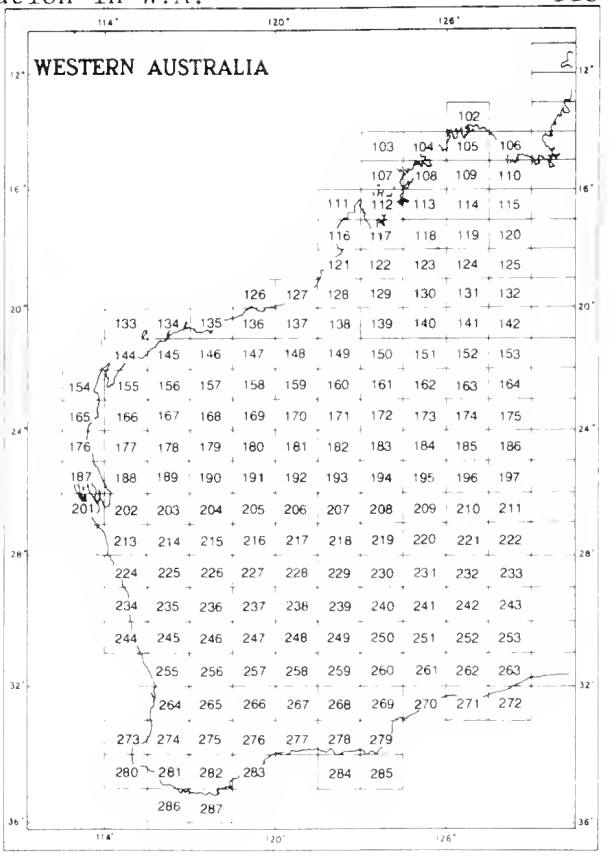


Verrucaria maura Wahlenb. ex Ach.

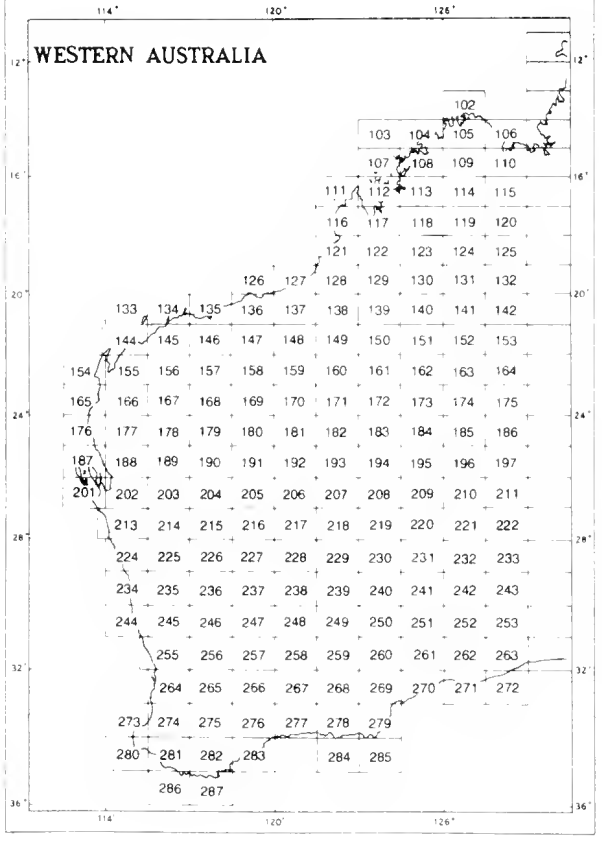


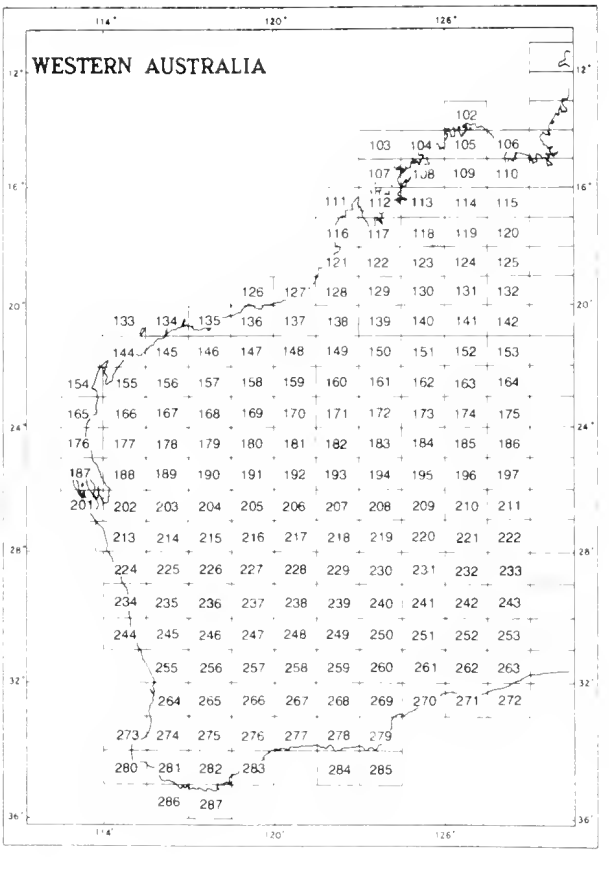
Xanthoria ectanea (Ach.) Räs. ex R.Filson





Xanthoria parietina (L.) Th.Fr.





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